2017 Post-Click It or Ticket (CIOT) 33-County Direct Observation Survey and Statewide Direct Observation Survey of Safety Belt and Mobile Device Use

Prepared for:
Michigan Office of Highway Safety Planning
Lansing, MI

Prepared by:
Michigan State University
East Lansing, MI

Date: August 2017

MICHIGAN
OHSP
Office of Highway Safety Planning

MICHIGAN STATE
UNIVERSITY

2017 Post-Click It or Ticket (CIOT) 33-County Direct Observation Survey and Statewide Direct Observation Survey of Safety Belt and Mobile Device Use

Prepared for:
Michigan Office of Highway Safety Planning
Lansing, MI

Prepared by:
Michigan State University
East Lansing, MI

Date: August 15, 2017

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle 2017 Post-Click It or Ticket (CIOT) 33-County Direct Observation Survey and Statewide Direct Observation Survey of Safety Belt and Mobile Device Use		5. Report Date: August 15, 2017	
		6. Performing Organization Code:	
7. Author(s) Timothy J. Gates, Peter T. Savolainen, Brendan J. Russo, and Steven Stapleton		8. Performing Organization Report No.	
9. Performing Organization Name and Address: Michigan State University 428 S. Shaw Lane Department of Civil and Environmental Engineering East Lansing, MI 48824		10. Work Unit No. (TRAIS)	
		11. Contract or Grant No.	
12. Sponsoring Agency Name and Address: Office of Highway Safety Planning 7150 Harris Drive Dimondale, MI 48821		13. Type of Report and Period Covered: Interim Report; May 1 - July 14	
		14. Sponsoring Agency Code:	
15. Supplementary Notes:			
16. Abstract: This report documents the results of the 2017 Post-Click It or Ticket Direct Observation Survey of Safety Belt and Mobile Device Use in the State of Michigan. Safety belt use by drivers and front seat passengers was monitored at a total of 200 intersection/interchange sites throughout the state during June 2017. In addition to belt use, data were collected for vehicle type and use, as well as the gender, age, and race for each observed occupant, and mobile device use for each observed driver. The results of this survey show the safety belt usage rate in the state of Michigan is 94.0 percent. This represents a marginal decrease from the 94.5 percent use rate in 2016. Males and younger occupants, specifically those in pick-up trucks, continue to exhibit lower belt use rates. The observed rate of mobile device use by all vehicle drivers is 6.9 percent, which represents a 0.6 percentage point decrease from the 7.5 percent device use rate observed in 2016. In addition to the official Post-CIOT Direct Observation Survey, observations were recorded and belt use rates were calculated in all 83 counties throughout Michigan. When weighted by total county vehicle miles traveled, the average safety belt use rate for all 83 counties was 93.3 percent, with a driver mobile device use rate of 7.5 percent.			
17. Key Words: Safety belt use, use rate by vehicle type, mobile device use rate, gender and demographic characteristics		18. Distribution Statement: Unlimited	
19. Security Classification (report): Unclassified	20. Security Classification (Page): Unclassified	21. No of Pages: 60	22. Price:

Technical Report Documentation Page

TABLE OF CONTENTS **PAGE**

1.0 INTRODUCTION 1

1.1 Study Purpose and Objectives 2
1.2 Study Area 2

2.0 METHODOLOGY 2

2.1 Design of Study 3
2.2 Data Collection Process 3
2.3 Alternate Sites and Rescheduling 4
2.4 Quality Control Procedures 4

3.0 SELECTION OF OBSERVATION SURVEY LOCATIONS 5

3.1 Sample Size and Precision 8
3.2 Outline for Data Collection 12

4.0 OBSERVER TRAINING 13

5.0 QUALITY CONTROL 15

6.0 DATA ANALYSIS 15

6.1 Imputation 16
6.2 Sampling Weights 16
6.3 Non-Responding Site Adjustment 16
6.4 Estimators 16
6.5 Variance Estimation 17
6.6 Non-Response Rate 18

7.0 POST-CIOT RESULTS AND CONCLUSIONS 19

7.1 Safety Belt Survey Results and Conclusions 19
7.2 Mobile Device Use Results and Conclusions 30

8.0 STATEWIDE SURVEY RESULTS 33

REFERENCES 36

APPENDIX I – Michigan Safety Belt Survey Cover Sheet and Data Collection Form 37

APPENDIX II – Resumes of Timothy J. Gates and Peter T. Savolainen 40

APPENDIX III – List of Post-CIOT Observation Locations by County, Stratum, and Road Classification, Including Safety Belt Use Observation Data 43

APPENDIX IV – List of 83-County Statewide Observation Survey Locations by County, Including Belt Use Observation Data 48

APPENDIX V – 2015 Vehicle Miles Traveled in Michigan, by County 53

LIST OF FIGURES **PAGE**

Figure 1: 33-County Sample for the Direct Observation Safety Belt Surveys……..…….7

Figure 2: Training Syllabus 14

LIST OF TABLES **PAGE**

Table 1: Michigan MAF/TIGER Feature Class Code Codes Included in the Road Segment File 3

Table 2: Safety Belt Use Codes and Definitions 4

Table 3: Michigan Average Motor Vehicle Crash-Related Fatalities by County (2005-2009) 6

Table 4: Roadway Functional Strata by County, Road Segments Population (N), Length of Selected Segments (miles), and Number of Segments Selected (n) 10-11

Table 5: Annual Vehicle Miles of Travel by Stratum (in 1,000's) 17

Table 6: Post-CIOT Weighted Safety Belt Use Rate for Drivers and Front-Seat Passengers 19

Table 7: Post-CIOT Raw/Unweighted Safety Belt Use Summary 19

Table 8: Post-CIOT Safety Belt Use Day and Time Sampling Summary 20

Table 9: Post-CIOT Safety Belt Use Rates by Stratum and County 21

Table 10: All Vehicles Post-CIOT Belt Use Summary 22

Table 11: Passenger Cars Post-CIOT Belt Use Summary 23

Table 12: Sport Utility Vehicles Post-CIOT Belt Use Summary 24

Table 13: Vans/Minivan Post-CIOT Belt Use Summary 25

Table 14: Pick-Up Trucks Post-CIOT Belt Use Summary 26

Table 15: Post-CIOT Belt Use by Demographic Characteristics 28-29

Table 16: Post-CIOT Weighted Mobile Device Use Rate for Drivers 30

Table 17: Post-CIOT Unweighted Mobile Device Use Rates by Use Type 30

Table 18: Post-CIOT Mobile Device Use Summary 31-32

Table 19: 83-County Statewide Survey Results by County and Occupant Type 33-35

1.0 INTRODUCTION

The use of safety belts is perhaps the single most effective means of reducing fatal and non-fatal injuries in motor vehicle crashes. In the first half of 2016, a statistical projection estimated 17,775 passenger vehicle occupants were killed in traffic crashes in the United States; an increase of 10.4 percent compared with 2015 [1]. Past research indicates that the use of safety belts reduces the risk of fatal injury to front seat occupants by approximately 45 percent for passenger vehicles and 60 percent for light trucks [2]. Moreover, the use of safety belts reduces the risk of moderate to critical injury by 50 percent for occupants of passenger vehicles and 65 percent for the occupants of light trucks [2]. In 2015 alone, safety belts saved approximately 13,941 passenger vehicle occupants over the age of 5 [2]. A recent study conducted by the National Highway Traffic Safety Administration (NHTSA) on the economic and societal impacts of motor vehicle crashes states "The comprehensive societal benefits from safety belt use are enormous" [3]. In fact, this study found that from 1975 to 2010, safety belts have prevented $7.6 trillion in societal harm as measured by comprehensive costs, and are currently preventing $330 billion in societal harm annually [3]. Therefore, even marginal increases in safety belt use rates have the potential to lead to important societal benefits.

In light of these facts, continuing efforts have been aimed at increasing the use of safety belts across the United States. According to a 2016 nationwide safety belt survey, 90.1 percent of drivers and right-front passengers use safety belts, which is a 1.6 percent increase from the 88.5 percent observed in 2015 [4]. The Midwest region as a whole showed an 85.5 percent safety belt use rate in 2016, an increase from the 81.7 percent safety belt use rate observed in 2015 [4]. In Michigan, past safety belt use studies indicate the overall use among front seat occupants increased until 2009, prior to a series of gradual declines. Despite these declines, the 2016 use rate was 94.5 percent, making Michigan one of 19 states with safety belt use rates higher than 90 percent [5]. It is important to recognize Michigan is currently one of the thirty-four "primary law" states, which means a motorist can be stopped and cited for the sole reason of not wearing a safety belt while driving or riding as a front-seat passenger. In "secondary law" states, motorists must be stopped for another traffic-related offense in order to be ticketed for not wearing a safety belt [4]. The most recent available national statistics (2016) indicate that states with primary safety belt laws exhibited an average use rate of 92.1 percent, which is 9.1 percent higher than the 83.0 percent exhibited by states without primary safety belt laws [4].

As the non-use of safety belts is ultimately a behavioral issue, targeted programs aimed at changing occupant behavior related to the use of safety belts represent an important tool to increase use rates. Such programs should be targeted toward those occupants who are most prone to low use rates. Identification of such occupants is one of the principal goals of the state belt use surveys. State safety belt use data can also be used for the following:

- To fulfill reporting requirements to NHTSA;

- To allocate statewide safety funding to specific program areas;
- To provide targeted funding to specific areas within the state where use rates are lower than the statewide average; and
- To provide targeted programs for certain segments of the population.

1.1 Study Purpose and Objectives

The purpose of this study was to perform the Post Click-It or Ticket (CIOT) Direct Observation Survey at 200 roadside locations to determine the percentage of drivers and front-seat passengers who were utilizing their safety belts correctly and the percentage of drivers using mobile devices. Additionally, to provide safety belt and mobile device use rates across all counties in Michigan, the study also included a direct observation survey within all 83-counties in Michigan. Additional objectives were as follows:

- Implement the methodology for estimating Michigan belt use in an economically feasible manner that is compliant with the Uniform Criteria for State Observational Surveys of Seat Belt Use;
- Provide training to all staff conducting the observation surveys and conduct quality assurance/quality control (QA/QC) of the data collection efforts;
- Conduct an observational survey of safety belt use for two weeks in the months of May and June;
- Summarize and cross-tabulate the observational data in a spreadsheet format indicating overall safety belt use, safety belt use by strata, safety belt use by time of day and day of week, and safety belt use by various demographic characteristics; and
- Continue to track changes in safety belt use and generate necessary comparative data and analyses to assess the relevancy of the 2017 data and compare results to previous surveys.

1.2 Study Area

The study area for the post-CIOT observational survey included those counties representing at least 85 percent of the passenger vehicle crash-related fatalities according to Fatality Analysis Reporting System (FARS) data averages for the years 2005 to 2009, which was the data analysis period required at the time the sampling methodology was developed in 2013. In addition, observational surveys were also performed across all 83 counties in Michigan, which the state performs periodically for internal use.

2.0 METHODOLOGY

The National Highway Traffic Safety Administration (NHTSA) issued new Uniform Criteria for State Observational Surveys of Seat Belt Use in *Federal Register Vol. 76, No. 63* (April 1, 2011, Rules and Regulations, pp. 18042 – 18059). The current survey plan represents Michigan's response to the requirement to submit to NHTSA a study and data collection protocol for an annual state survey to estimate passenger vehicle occupant restraint use. This plan is fully compliant with the Uniform Criteria and was utilized for the implementation of Michigan's 2017 safety belt survey.

2.1 Design of Study

Michigan is comprised of 83 counties; 40 of which account for about 85 percent of the passenger vehicle crash-related fatalities according to FARS data averages for the years 2005 to 2009. Therefore, observation locations from within these 40 counties were eligible to be selected for inclusion in the survey.

Using 2010 Topologically Integrated Geographic Encoding and Referencing (TIGER) data developed by the U.S. Census Bureau, a comprehensive list of road segments from within 33 of the 40 counties was created. Each of these road segments has been classified by the U.S. Census Bureau using the MAF/TIGER Feature Class Code (MTFCC). There are primarily three classifications: 1) Primary Roads, 2) Secondary Roads, and 3) Local Roads (See Table 1 for detailed definitions). In addition, the listings include segment length as determined by TIGER. This descriptive information allowed for stratification of road segments. A systematic probability proportional to size (PPS) sample was employed to select the road segments to be used as observation sites. This process is explained in further detail in Section 3 of this report.

Table 1. Michigan MAF/TIGER Feature Class Code Codes Included in the Road Segment File

Code	Name	Definition
S1100	Primary Road	Primary roads are generally divided, limited-access highways within the interstate highway system or under state management, and are distinguished by the presence of interchanges. These highways are accessible by ramps and may include some toll highways.
S1200	Secondary Road	Secondary roads are main arteries, usually in the U.S. Highway, State Highway, or County Highway system. These roads have one or more lanes of traffic in each direction, may or may not be divided, and usually have at-grade intersections with many other roads and driveways. They often have both a local name and a route number.
S1400	Local Neighborhood Road, Rural Road, City Street	These are generally paved non-arterial streets, roads, or byways that usually have a single lane of traffic in each direction. Roads in this feature class may be privately or publicly maintained. Scenic park roads would be included in this feature class, as would (depending on the region of the country) some unpaved roads.

2.2 Data Collection Process

All passenger vehicles, including commercial vehicles weighing less than 10,000 pounds, were eligible for observation. The cover sheet and data collection form are shown in Appendix I. The cover sheet was designed to allow for documentation of descriptive site information, including: date, site location, site number, alternate site data, assigned traffic flow, number of lanes available and observed, start and end times for observations, and weather conditions. This cover sheet was completed by the data collector at each site before any observations took place.

The observation form was used to record safety belt use by drivers and front seat passengers. Additional data to be collected included occupant age, gender, and ethnicity, as well as vehicle type and use (e.g. commercial or non-commercial) information. Data regarding the use of mobile devices was also collected. This included information on how the device was used as well (e.g. talking, texting, or hands-free). The forms were labeled from 1 to the total number of forms utilized at each site to assist with data review and inventorying.

The data collectors were instructed to observe as many lanes of traffic as they could while obtaining data on 99 percent of eligible vehicles. Only one direction of traffic was observed at any given site. This direction of observation was pre-determined at each location as explained further in section 3.1.

Observations were made of all drivers and right-front seat occupants. This included children riding in booster seats. The only right-front seat occupants excluded from this study were child passengers who were traveling in child seats with harness straps. Table 2 lists all categories of safety belt use that were observed by the data collectors.

Table 2. Safety Belt Use Codes and Definitions

Code	Definition
Belted	The shoulder belt is in front of the person's shoulder and used correctly.
Not belted	The shoulder belt is not in front of the person's shoulder or not used at all.
Unknown	It cannot reasonably be determined whether the driver or right front passenger is belted.

2.3 Alternate Sites and Rescheduling

If a site was temporarily unavailable due to a crash, short-term road work or maintenance, inclement weather, or any event that may hinder exact results, data collection was rescheduled for a similar time of day and type of day of the week. In the event the site was permanently unavailable, such as being located within a gated community or closed for long-term construction, then an alternate site selected as part of the reserve sample was to be used as a permanent replacement.

2.4 Quality Control Procedures

The quality control (QC) monitor made unannounced visits to five percent of all data collection sites over the duration of the study. The purpose of these visits was to ensure data collectors were following all survey protocol including: performing observational surveys at the assigned location, in the assigned direction, during the assigned time period, completing the cover sheet and observation forms correctly, making accurate observations of safety belt use within an appropriate number of lanes.

3.0 SELECTION OF OBSERVATION SURVEY LOCATIONS

This research design conforms to the requirements of the Uniform Criteria and allows for estimates of restraint use among front seat occupants in passenger vehicles. Michigan intends to update the sample of data collection sites every five years in order to have survey results that reflect geographic areas with more than 85 percent of crash-related fatalities. The sample design was provided to the Michigan Office of Highway Safety Planning under a consultant agreement with Michigan State University (see Appendix II for the resume of the Principal Investigators, Dr. Timothy Gates and Dr. Peter Savolainen). The design approach includes a stratified systematic PPS sample of data collection sites as described here:

1. All 83 counties in Michigan were listed in descending order of the average number of motor vehicle crash-related fatalities for the period from 2005 to 2009. FARS data were used to determine the average number of crash-related fatalities per county. It was determined 40 counties accounted for at least 85 percent of Michigan's total crash-related fatalities during this period as shown in Table 3. These counties comprise the sample frame.

2. The counties were stratified according to historical safety belt use rates into four groups. These strata were constructed such that the annual vehicle miles of travel (VMT) were approximately balanced within each of the four groups. This represents the first stage of sample selection.

3. At the second stage, road segments were explicitly stratified by MTFCC (see Table 4). This resulted in a total of 12 strata (4 belt use groups, each with 3 MTFCC classes). The number of sites within each MTFCC class was determined proportionately based upon historical VMT, resulting in 30 percent primary roads, 60 percent secondary roads, and 10 percent local roads.

4. Road segments were then implicitly stratified by county and segment length. Specific segments were selected randomly with PPS from all segments within each stratum. A random, systematic sample of 50 road segments was selected PPS to road segment length within each belt use group. This process resulted in the selection of 200 road segments (4 belt use rate groups x 50 sites per belt use rate group, allocated proportionately among MTFCC classes). An additional 200 sites were also selected to use as alternates. Out of the 40 possible counties that comprised the sample frame, the final list of observation sites contained locations in 33 of the counties. Figure 1 shows a map displaying the 33-county sample for the post-CIOT direct observation safety belt survey.

Table 3. Michigan Average Motor Vehicle Crash-Related Fatalities by County (2005-2009)

County	Average Fatality Counts (2005-2009)	Fatality Percentage Within Michigan	Cumulative Fatality Percentage
Wayne	172	16.5	16.5
Oakland	61.8	5.9	22.5
Kent	58.4	5.6	28.1
Genesee	48.6	4.7	32.7
Macomb	47.6	4.6	37.3
Washtenaw	31.4	3	40.3
Kalamazoo	25.4	2.4	42.8
Saginaw	24.4	2.3	45.1
Ottawa	23.6	2.3	47.4
Berrien	22.4	2.2	49.5
Monroe	20.6	2	51.5
Muskegon	19.2	1.8	53.3
Calhoun	18.8	1.8	55.1
Ingham	18.8	1.8	56.9
Livingston	18.6	1.8	58.7
Jackson	18.2	1.7	60.5
St. Clair	17.2	1.7	62.1
Allegan	16.6	1.6	63.7
Van Buren	15.8	1.5	65.2
Eaton	13.4	1.3	66.5
Lapeer	13.2	1.3	67.8
St. Joseph	13.2	1.3	69.1
Lenawee	12.4	1.2	70.2
Tuscola	11.4	1.1	71.3
Montcalm	10.6	1	72.4
Bay	10.4	1	73.4
Grand Traverse	10.2	1	74.3
Cass	10	1	75.3
Clinton	9.8	0.9	76.2
Sanilac	9.4	0.9	77.1
Shiawassee	9.4	0.9	78
Newaygo	9.2	0.9	78.9
Barry	8.8	0.8	79.8
Branch	8.8	0.8	80.6
Midland	8.8	0.8	81.5
Hillsdale	8	0.8	82.2
Ionia	7.8	0.7	83
Wexford	7.6	0.7	83.7
Clare	7	0.7	84.4
Gratiot	6.6	0.6	85.0

5. It was initially expected each site would result in a sample size of approximately 125 vehicles, resulting in approximately 25,000 vehicle observations overall based upon past experience with the Michigan Annual Safety Belt Use Study. Based on these figures, the standard error was expected to be less than 2.5 percent. In the event the calculated standard error should be greater than 2.5 percent, additional data would be collected from existing sites until this criterion was satisfied.

6. Additional stages of selection were used to determine travel direction, lane, and vehicles to be observed, at random and with known probability, as appropriate under the Uniform Criteria, as described in Section 3.1.

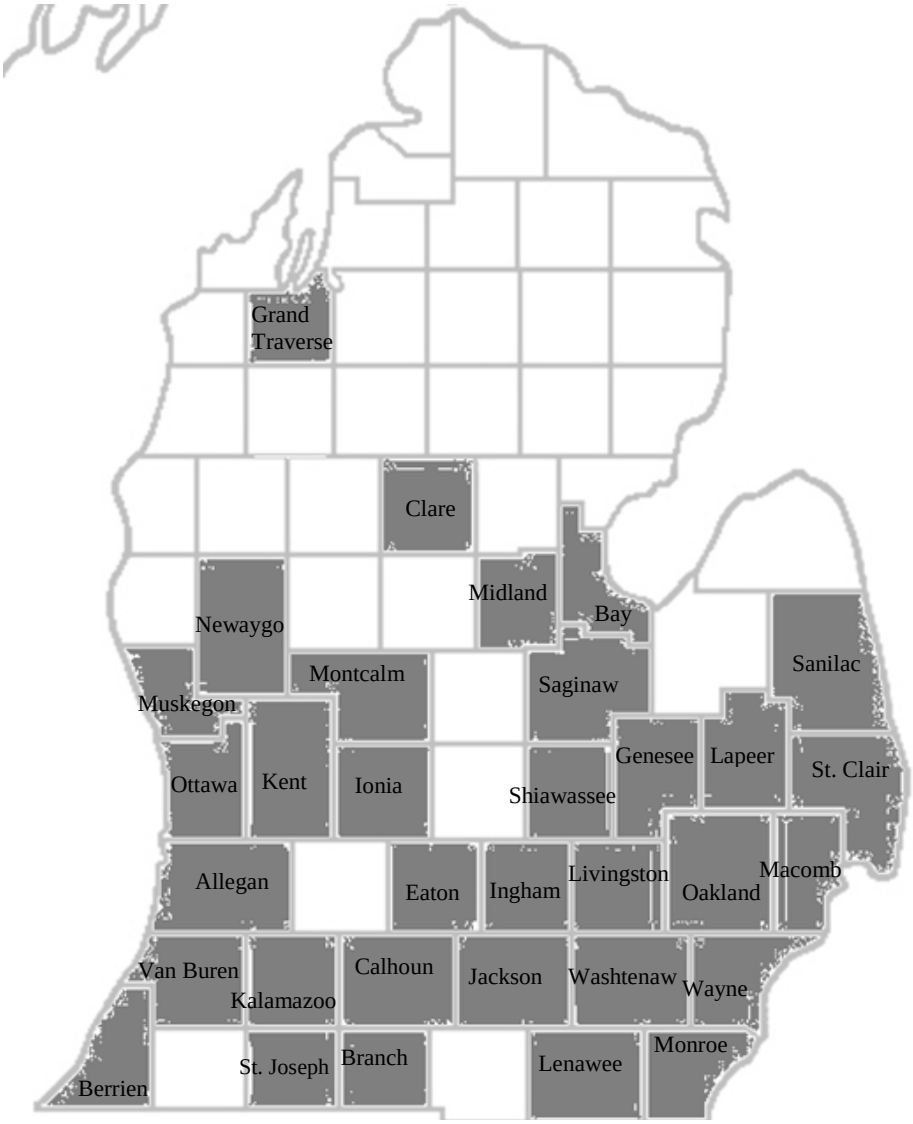

Figure 1: 33-County Sample for the Direct Observation Safety Belt Surveys

3.1 Sample Size and Precision

A standard error of less than 2.5 percent for the safety belt use estimates is required by the Final Rule. Since 1999, Michigan has conducted the Michigan Annual Safety Belt Use Study, and has historically obtained standard errors below this threshold (e.g. most recently 0.2 percent in 2016) via observed sample sizes of approximately 25,000 vehicles. Since the proposed design for the 2017 Post-CIOT survey was identical to the 2016 survey, it was expected that the sample size for the 2017 Post-CIOT Survey would be similar to the 2016 Annual Survey and the precision objective was expected to be achieved. In the event that the precision objective was not met, additional observations would be taken starting with those sites having the fewest observations. New data would be added to existing data until the desired precision was achieved.

Within each of these four belt use groups, a total of 50 road segments were selected. Michigan employed the Census TIGER data for the selection of road segments. Michigan exercised the available exclusion option and removed rural local roads in counties not within Metropolitan Statistical Areas (MSAs), and other non-public roads, unnamed roads, unpaved roads, vehicular trails, access ramps, cul-de-sacs, traffic circles, and service drives from the dataset. The number of road segments selected within each MTFCC class was determined proportionately based upon total annual VMT within the three classes (Primary, Secondary, and Local). Thus, the segments selected ultimately included 15 primary roads (20 percent of sample), 30 secondary roads (60 percent of sample), and 5 local roads (10 percent of sample).

Prior to selecting the specific observation locations, all road segments were explicitly stratified by MTFCC (primary, secondary and local) within each of the four belt use rate groups and implicitly stratified by county and by segment length to obtain an ordered list. Implicit stratification by county was done to ensure adequate geographic coverage was obtained as a part of the selection process. Similarly, the implicit stratification by length ensured representative coverage within each MTFCC class since higher-class roads tended to be longer than lower-class roads. Specific road segments were then selected with PPS using segment length as the measure of selection (MOS). As such, the inclusion probability for a specific road segment is:

$$\pi_{h|gc} = n_{gc} l_h / \sum_{\forall h} l_h,$$

where n_{gc} is the road segment sample size for MTFCC *c* in stratum g that was allocated, l_h is the length of road segment h, and

$$\sum_{\forall h} l_h$$

is the total length of all segments in stratum g and MTCFF *c*. If a segment was selected with certainty (i.e., its MOS was equal to or exceeded $\sum_{\forall h} l_h / n_{gc}$), it was set aside as a certainty selection and the probabilities of selection were recalculated for the remaining segments in the MTCFF class. This was repeated and the certainty selections were identified successively until no segment's MOS was equal to

or exceeded the re-calculated $\sum_{\forall h} l_h / n_{gc}$. After each certainty segment was removed, the total segment length of the MTCFF class was then recalculated, as well as the probabilities of selection for the remaining segments, until no more segments were selected with certainty.

After all certainty segments were identified, a sampling interval (*I*) was calculated as the total length across all road segments within each MTFCC group divided by the number of road segments to select within each group (i.e., 15 primary, 30 secondary, and 5 local). A random start (RS) was selected between 0 and the calculated *I*, which determined the first road segment selected. Subsequent road segments selected were determined by adding multiples of *I* to the RS until the desired number of road segments were selected and/or the end of the sorted list was reached.

Table 4 presents summary statistics detailing the number of eligible road segments, the total length (miles) of these segments, and the number of road segments selected within each of the MTFCC classes by belt use group and county. Appendix III presents the complete list of the final observation sites including belt use stratum, county, and road classification.

In the event an original road segment was permanently unavailable, a reserve road segment was to be used. The reserve road segment sample consisted of one additional road segment per original road segment selected, resulting in a reserve sample of an additional 200 road segments. These reserve segments were identified and selected as the road segments immediately following the original road segment actually selected. Thus, these segments were also explicitly stratified by safety belt use and MTFCC group, as well as implicitly stratified by segment length and county. Each reserve segment corresponded to an original road segment actually selected. Thus, these are considered selected with PPS using road segment length as MOS by the same approach as described previously. As such, for the purposes of data weighting, the reserve road segment inherited all probabilities of selection and weighting components up to and including the road segment stage of selection from the original road segment actually selected. Probabilities and weights for any subsequent stages of selection (e.g., the sampling of vehicles) would be determined by the reserve road segment itself.

Table 4. Roadway Functional Strata by County, Road Segments Population (N), Length of Selected Segments (miles), and Number of Segments Selected (n)

Strata	County		MTFCC Strata			Total
			Primary	Secondary	Local	
1	Ingham	N	37	147	6162	6346
		Length	169	417	3111	3697
		n	3	7	1	11
	Kalamazoo	N	46	71	6611	6728
		Length	171	284	3433	3888
		n	4	5	0	9
	Oakland	N	40	172	29104	29316
		Length	349	556	10287	11192
		n	5	13	3	21
	Washtenaw	N	19	76	8183	8278
		Length	116	268	3841	4225
		n	3	5	1	9
2	Allegan	N	14	52	4416	4482
		Length	161	287	3656	4104
		n	1	3	1	5
	Bay	N	19	111	3580	3710
		Length	253	330	2568	3151
		n	2	3	0	5
	Calhoun	N	11	110	4937	5058
		Length	156	291	3200	3647
		n	2	2	1	5
	Eaton	N	11	88	3002	3101
		Length	182	368	2497	3047
		n	2	4	0	6
	Grand Traverse	N	0	55	5485	5540
		Length	0	236	2731	2967
		n	0	2	0	2
	Jackson	N	8	142	5203	5353
		Length	108	416	3104	3628
		n	1	4	1	6
	Kent	N	29	142	15063	15234
		Length	285	633	6841	7759
		n	4	5	1	10
	Livingston	N	17	41	7119	7177
		Length	101	211	3267	3579
		n	1	2	0	3
	Midland	N	3	28	3481	3512
		Length	1	106	2285	2392
		n	0	1	1	2
	Monroe	N	7	55	3531	3593
		Length	145	291	2760	3196
		n	2	3	0	5
	Ottawa	N	3	52	7080	7135
		Length	4	220	3417	3641
		n	0	1	0	1
3	Barry	N	1	132	2894	3027
		Length	0	237	2148	2385
		n	0	0	0	0
	Berrien	N	37	107	6495	6639
		Length	72	390	3121	3583
		n	3	0	0	3
	Branch	N	6	37	2231	2274
		Length	133	184	1844	2160
		n	1	0	0	1
	Cass	N	2	74	2850	2926
		Length	0	213	1844	2057
		n	0	0	0	0
	Clare	N	10	65	4408	4483
		Length	101	193	2532	2826
		n	2	0	0	2

Table 4 - Roadway Functional Strata by County, Road Segments Population (N), Length of Selected Segments (miles), and Number of Segments Selected (n) (Continued)

Strata	County		MTFCC Strata			Total
			Primary	Secondary	Local	
3	Clinton	N	28	78	2277	2383
		Length	71	185	2494	2750
		n	0	0	0	0
	Genesee	N	18	78	9622	9718
		Length	357	409	4674	5440
		n	2	0	0	2
	Gratiot	N	3	37	1641	1681
		Length	46	147	2205	2398
		n	0	0	0	0
	Hillsdale	N	0	76	2150	2226
		Length	0	346	2196	2541
		n	0	0	0	0
	Ionia	N	8	78	2376	2462
		Length	73	234	2205	2512
		n	0	0	1	1
	Lapeer	N	3	31	2883	2917
		Length	144	216	3129	3490
		n	0	1	0	1
	Lenawee	N	1	104	3398	3503
		Length	1	378	2666	3045
		n	0	3	1	4
	Montcalm	N	4	73	4095	4172
		Length	63	380	4041	4484
		n	0	4	0	4
	Muskegon	N	5	44	5660	5709
		Length	90	196	3033	3319
		n	0	1	1	2
	Newaygo	N	0	104	3441	3545
		Length	0	360	3042	3402
		n	0	4	0	4
	Saginaw	N	8	149	5252	5409
		Length	154	633	4327	5114
		n	2	5	1	8
	Sanilac	N	1	88	2208	2297
		Length	0	495	2912	3407
		n	0	5	0	5
	Shiawassee	N	6	32	2276	2314
		Length	50	206	2113	2369
		n	1	1	1	3
	St. Clair	N	22	121	4189	4332
		Length	182	329	2975	3486
		n	3	3	0	6
	St. Joseph	N	1	66	3147	3214
		Length	0	295	2550	2846
		n	0	3	0	3
	Tuscola	N	0	88	2061	2149
		Length	0	402	2971	3373
		n	0	0	0	0
	Van Buren	N	8	27	3512	3547
		Length	189	89	2843	3121
		n	1	0	0	1
	Wexford	N	0	65	3274	3339
		Length	0	299	2458	2757
		n	0	0	0	0
4	Macomb	N	14	203	16727	16944
		Length	67	427	5545	6039
		n	4	15	3	22
	Wayne	N	50	180	26982	27212
		Length	690	982	12387	14059
		n	11	15	2	28

Road segments were mapped according to the latitude and longitude of their midpoints. The selected road segment was identified by an intersection or interchange that occurred within or just beyond the segment. Data collection sites were deterministically selected such that traffic would be moving during the observation period. Therefore, sites were assigned to locations within the segment that were 50 to 150 feet from any controlled intersections. For limited access roadways, data collection occurred on a ramp carrying traffic exiting the highway. The observed direction of travel was randomly assigned for each road segment. The locations of the data collection sites were described on site assignment sheets and GPS coordinates were determined for the approximate location at which the observer was to stand. The GPS coordinates also allowed for efficient navigation to each observation site to assist the data collectors and QC monitors travelling to the assigned locations.

3.2 Outline for Data Collection

For each selected observation site, vehicles were observed for exactly 60 minutes. These observations were appropriately weighted, as explained in the Data Analysis Section of this report (Section 6.0). The data collected for the 200 observation sites provided a representative sample for each day of the week and each hour of the day for the safety belt use characteristics of the state.

The driver of each vehicle and the passenger in the front-right seat of the vehicle were observed for safety belt use, non-use, and misuse. The driver and passenger belt observation categories included 'belted correctly', 'not belted correctly', and 'unknown belt use' as previously described. An occupant was recorded as 'belted correctly' only if they were observed to be properly using the shoulder belt (i.e. shoulder belt was across chest; not under arm or behind back). The 'unknown belt use' category was marked if an observer was unable to determine the position of an occupant's safety belt. These observations were not included in the final sample but a record was kept to calculate the non-response rate which is discussed in the data analysis section of this report. In the surveys, both the driver and front-seat passenger were separately identified based upon their gender, estimated age, and race. The driver and passenger gender categories consisted of male, female, and unknown. The driver age categories included 16-29, 30-59, 60 and over, and unknown. The passenger age categories included 0-15, 16-29, 30-59, 60 and over, and unknown. The driver and passenger races were categorized as Caucasian, African American, other, or unknown. The vehicles were categorized into four groups: passenger cars, sport utility vehicles, vans or minivans, and pick-up trucks. The vehicles were also identified as being commercial or non-commercial vehicles. Furthermore, the driver was also observed for any indication of mobile device use. The categories included 'hand-held (talking)', 'hand-held (typing)', 'hands-free (ear piece)', and hands-free (no ear piece)'. For cases where a driver was observed to be using a 'hands-free' device, observers also recorded whether an earpiece was visible or not.

Data collectors also counted every vehicle that passed through the lanes they were observing during the 60-minute observation using a hand counter. This volume count was then utilized during the belt use weighting procedure. Observations were manually recorded in the field on survey forms and returned back to the office within 24 hours of the data collection, or as soon as possible after multiple day trips to outstate locations. The data collected in the field were entered into a spreadsheet by the observer at the conclusion of the data collection activities for each day and verified for accuracy in the office by office staff.

4.0 OBSERVER TRAINING

The Principal Investigators from MSU and WSU served as the QC monitors, conducting site audits of the data collectors. Each data collector was monitored at least once by a QC monitor. The data collectors were comprised of MSU and WSU staff, many of whom have participated in prior safety restraint use surveys. All data collectors were able to stand for long periods of time, work outdoors, and successfully complete the training program. The training program for data collectors was conducted at MSU and was attended by both MSU and WSU staff. The training program began approximately four weeks prior to the first data collection period and included both lecture and classroom and field exercises, with repeated field training in the weeks leading up to the survey. The syllabus for the training program is shown as Figure 2.

At the conclusion of the classroom training, the data collectors conducted their first field practice at a location near the MSU campus. QC monitors were available during this period to respond to questions and offer assistance to data collectors as needed. Reliability and repeatability field data collection practice continued during the weeks leading up to full-scale survey implementation.

The reliability and repeatability studies were performed at various intersections near the MSU and WSU campuses, as well as additional locations in mid and southeast Michigan. These intersections represented various site characteristics that could be challenging for observational data collection. Over a period of several weeks, observers were randomly divided into groups and assigned to collect safety belt observational data independently. Also during this period, another exercise paired inexperienced observers with experienced observers, who noted which individual vehicle the entire group was to evaluate. This allowed an analysis of the accuracy of the inexperienced data collectors in comparison to those who have participated in the study previously.

Day 1 – In-Class Training Program and Field Practice

Welcome, introductions, and distribution of materials

Survey overview

Scheduling and rescheduling
- Site Assignment Sheet
- Observation periods
- Temporary impediments such as weather
- Permanent impediments at data collection sites

Site locations
- Locating assigned sites
- Alternate site selection
- Interstate ramps and surface streets
- Direction of travel/number of observed lanes

Data collection techniques
- Definitions of belt/booster seat use, passenger vehicles
- Observation protocol: belt use, vehicle type/use, demographic characteristics
- Unobservable vehicles/occupants

Data collection forms
- Cover sheet
- Recording alternate site information
- Recording observations

Data entry procedures

Travel reports, lodging, and auto reservations

Field practice at ramps and surface streets

Days 2-10 Continued Field Practice

Field practice at ramps and surface streets

Figure 2. Training Syllabus

The data was then summarized and compared among the observers in each group to determine the accuracy of their observations. Upon completion of the training for the data collection, each member of the data collection team received a training manual composed of the information detailed during the training session, the schedule of data collection, and all necessary field supplies.

5.0 QUALITY CONTROL

The policies and procedures utilized while conducting the direct observation surveys of safety belt use were based upon the *Uniform Criteria for State Observational Surveys of Seat Belt Use* from Title 23, Part 1240.12 of the Code of Federal Regulations. The study design for the Post-CIOT Survey was consistent with these criteria, which established observations should be conducted on specific dates and times and in particular directions of travel, all of which were determined randomly in advance of the studies. Further, the criteria state policies should be in place in the event observations cannot be made due to unanticipated events, such as road construction. In such situations, data collectors were instructed to observe at the pre-assigned alternate location. Policies must also be established for the case where traffic flow is too heavy to observe all vehicles or traffic is moving too quickly for observation. In most instances, high traffic volumes prohibit data collectors from observing all vehicles. Consequently, data collectors were instructed to observe as many vehicles as is feasible for observation under such conditions for the required time period of 60 minutes.

All belt use observations were conducted during weekdays and weekends between 7 a.m. and 7 p.m. The schedule included rush hour (before 9:30 AM and after 3:30 PM) and non-rush hour observations. Data collection was conducted for 60 minutes at each site. Approximately five sites were scheduled each day for each data collector. Start times and days were staggered to ensure all days of the week and hours of the day (during daylight) were represented in the sample.

Site assignment sheets were provided to the data collectors and QC monitors. These indicated the observed road name, the crossroad included within the road segment (or nearest crossroad), GPS coordinates, assigned date, assigned time, and assigned direction of travel. Sites within relatively close geographic proximity were assigned as data collection clusters. The first site within each cluster was assigned a random day and time for completion. All other sites within a cluster were assigned to the same day in order to minimize travel costs. The sites were scheduled by geographic proximity to minimize travel within the cluster.

During the full-scale data collection activities, independent auditors were sent out to the field to covertly observe the data collectors. These field audits were conducted to ensure compliance with the data collection procedures. No major violations of policies or procedure were observed as a part of these audits. The random checks were conducted at least once for each observer and a total of ten sites were audited, representing five percent of all observational sites.

6.0 DATA ANALYSIS

The data collected in the field as a part of the 33-county post-CIOT survey were entered into a spreadsheet by the observer at the conclusion of the data collection activities for each day and verified for accuracy by office staff. Rates for safety belt and mobile device use were determined for each survey stratum, county, location, etc., as well as the statewide post-CIOT average. A 95-percent confidence

interval for each use rate estimate was determined according to the NHTSA guidelines. The following sections outline the methods used to estimate the use rate and variance for safety belts. A similar procedure was utilized to estimate mobile device use rate and variance.

6.1 Imputation

No imputation was done on missing data.

6.2 Sampling Weights

The following is a summary of the notation used in this section.

g – Subscript for belt use group strata

h – Subscript for road segment strata

i – Subscript for road segment

j – Subscript for time segment

k – Subscript for road direction

l – Subscript for lane

m – Subscript for vehicle

n – Subscript for front-seat occupant

Under this stratified multistage sample design, the inclusion probability for each observed vehicle was the product of selection probabilities at all stages: π_g for belt use group (stratum-road class), $\pi_{hi|g}$ for road segment, $\pi_{j|ghi}$ for time segment, $\pi_{k|ghij}$ for direction, $\pi_{l|ghijk}$ for lane, and $\pi_{m|ghijkl}$ for vehicle. So the overall vehicle inclusion probability was:

$$\pi_{ghijklm} = \pi_g \pi_{hi|g} \pi_{j|ghi} \pi_{k|ghij} \pi_{l|ghijk} \pi_{m|ghijkl}.$$

The sampling weight (design weight) for vehicle *m* is:

$$w_{ghijklm} = \frac{1}{\pi_{ghijklm}}$$

6.3 Non-Responding Site Adjustment

There were no sites which required 'non-responding' adjustment in the 2017 Post-CIOT Direct Observation Survey of Safety Belt Use.

6.4 Estimators

Noting all front-seat occupants were observed, the driver/passenger safety belt use status was:

$$y_{ghijklmn} = \begin{cases} 1, \text{if belt used} \\ 0, \text{otherwise} \end{cases}$$

In order to most accurately estimate the weighted safety belt use rate for the entire state of Michigan, the estimator used in this analysis was weighted by segment length and stratum-level VMT to determine the overall post-CIOT belt use rate in Michigan. This estimation technique is detailed in *An Example of a Compliant State Seat Belt Use Survey Design* [6]. Under this estimator, the use rates within each stratum were first calculated using the road segment length based estimator:

$$p_{L_{gh}} = \frac{\sum_{all\ tfkimn\ in\ gh} w_{tfkim|gh} Length_{ght} y_{ghtfkimn}}{\sum_{all\ tfkimn\ in\ gh} w_{tfkim|gh} Length_{ght}}$$

The twelve stratum-specific use rates were then weighted by the proportion of total statewide VMT (shown in Table 5) within each stratum, which resulted in the road class VMT-based estimator (p_{VMT}):

$$p_{VMT} = \frac{\sum_g w_g \sum_h VMT_{gh} p_{gh}}{\sum_g w_g \sum_h VMT_{gh}}$$

Table 5. Annual Vehicle Miles of Travel by Stratum (in 1,000s)

Belt Use Stratum	Road Class			Total
	Primary	Secondary	Local	
1	7,576,298	11,371,893	2,217,122	**21,165,313**
2	7,517,022	11,617,548	1,809,337	**20,943,907**
3	5,985,436	13,303,119	2,198,301	**21,486,856**
4	7,604,025	11,167,232	2,343,003	**21,114,260**
Statewide	**28,682,781**	**47,459,792**	**8,567,763**	**84,710,336**

The use of the VMT-based estimator (p_{VMT}) reduced the weighting bias towards local road observation sites by accounting for their relatively short length and low VMT as compared to primary and secondary roads. VMT data were obtained from the Michigan Highway Performance Monitoring System (HPMS) for the year 2013.

6.5 Variance Estimation

The variance (and standard error) for each estimator was determined using the "Delete-1 Jackknife" variance estimation program in SUDAAN 11 software. Under this methodology, the variance was calculated by deleting one observation location and adjusting the weights of the remaining PSU's in the same stratum to account for the deleted PSU. The procedure was repeated, removing each location once. For the road class VMT based estimator (p_{VMT}), the "Delete-1 Jackknife" method was used to estimate the variances within each of the road class/belt use strata:

$$V(p_{gh}) = \left(\frac{n_{gh}-1}{n_{gh}}\right)\sum_{i=1}^{n_{gh}}(p_{ghi}-p_{gh})(p_{ghi}-p_{gh})'$$

where:

$V(p_{gh})$ = Estimated variance within each of the road class/belt use strata

p = Estimated belt use rate

p_{ghi} = Estimated belt use rate at location *i* in road segment type *h* in belt use group *g*

p_{gh} = Estimated belt use rate in road segment type *h* in belt use group *g*

n_{gh} = Number of locations of road segment type *h* in belt use group *g*

The variance for the post-CIOT use rate was then determined using the following equation:

$$V(p) = \frac{\sum_{\forall g,\forall h} VMT_{gh}^2 V(p_{gh})}{\left(\sum_{\forall g,\forall h} VMT_{gh}\right)^2}$$

where:

$V(p)$ = Estimated variance of statewide belt use rate

The standard error of the statewide use rate was found by simply taking the square root of the estimated variance. The 95 percent confidence interval of the statewide belt use was equal to the weighted safety belt use rate plus/minus 1.96 (for the Z-test at alpha = 0.05) multiplied by the standard error expressed as a percent.

6.6 Non-Response Rate

According to NHTSA's guidelines, the non-response rate for the annual safety belt survey cannot exceed 10 percent. A non-response occurs when the observer was not able to determine the safety belt use of a front seat vehicle occupant. This can occur due to a variety of reasons such as tinted windows, sun glare, high speeds of the vehicle in question, etc. Observers in the field marked either 'vehicle not observable' or 'unknown belt use' to keep a record of the non-response rate. There were a total of 549 non-response observations which represents approximately 1.8 percent of the total number of observations. This non-response rate was below the allowable maximum of 10 percent established by the NHTSA.

7.0 POST-CIOT RESULTS AND CONCLUSIONS

The Post-CIOT Direct Observation Survey was performed between Monday, June 5, and Sunday, June 18, 2017. During this observation period, a total of 24,461 vehicles were observed resulting in 30,451 driver and right-front passenger observations at the 200 observation sites randomly selected to represent statewide safety belt use according to the federal Uniform Criteria.

7.1 Safety Belt Survey Results and Conclusions

The overall weighted post-CIOT safety belt use rate for Michigan in 2017 was found to be 94.0 percent and is shown in Table 6. The overall weighted post-CIOT safety belt use rate was calculated based upon the procedure described in the Data Analysis section (Section 6.0) of this report. When the safety belt usage rates were calculated, belted occupants included all drivers and front-seat passengers who were belted correctly. The "not belted" occupants included drivers and front-seat passengers who were not belted or who were wearing the belt incorrectly; either under their arm or behind their back. Details of the observations on an intersection level are provided in Appendix III. It should be noted that all of the observation sites were original sites, as there were no instances in which the original site was unobservable and the data collector had to move to an alternate site.

Table 6: Post-CIOT Weighted Safety Belt Use Rate for Drivers and Front-Seat Passengers

Observational Wave	Safety Belt Use Rate*	Standard Error
Post-Click It or Ticket Observational Survey	94.0% ± 0.6%	0.3%

* Weighted Safety Belt Usage ± 95% Confidence Band

The overall post-CIOT use rate displayed in Table 6 is representative of all front seat occupants (drivers and right-front passengers), all daytime hours (7:00 AM-7:00 PM) and all days of the week. Table 7 shows the raw (unweighted) safety belt use information separated by drivers and front-right passengers. Table 8 summarizes the descriptive statistics for the safety belt survey in terms of sampling statistics for day of the week and time of the day.

Table 7. Post-CIOT Raw/Unweighted Safety Belt Use Summary

Belt Use	Actual Total No. of Observations	Actual Belted No. of Observations	% Safety Belt Use
Drivers	24,398	22,968	94.14%
Passengers	6,053	5,677	93.79%
Total	**30,451**	**28,645**	**94.07%**

Table 8. Post-CIOT Safety Belt Use Day and Time Sampling Summary

Day of the Week	Post-CIOT Safety Belt Observations			
	No. of Sites Observed	**Percent of Sites in Day of Week**	**Actual Total No. of Observations (Occupants)**	**Percent of Observations in Day of Week (Occupants)**
Sunday	20	10.0%	2,898	9.5%
Monday	25	12.5%	3,341	11.0%
Tuesday	25	12.5%	3,320	10.9%
Wednesday	29	14.5%	4,061	13.3%
Thursday	36	18.0%	5,225	17.2%
Friday	28	14.0%	4,797	15.8%
Saturday	37	18.5%	6,809	22.4%
Total	**200**	**100.0%**	**30,451**	**100.0%**
Time of the Day	**Post-CIOT Safety Belt Observations**			
	No. of Sites Observed	**Percent of Sites in Time of Day**	**Actual Total No. of Observations (Occupants)**	**Percent of Observations in Day of Week (Occupants)**
7 am – 8 am	8	4.0%	1,068	3.5%
8 am – 9 am	14	7.0%	1,805	5.9%
9 am – 10 am	14	7.0%	1,798	5.9%
10 am – 11 am	24	12.0%	4,073	13.4%
11 am – 12 pm	21	10.5%	3,063	10.1%
12 pm – 1 pm	20	10.0%	2,838	9.3%
1 pm – 2 pm	21	10.5%	3,290	10.8%
2 pm – 3 pm	22	11.0%	2,894	9.5%
3 pm – 4 pm	17	8.5%	2,910	9.6%
4 pm – 5 pm	15	7.5%	2,566	8.4%
5 pm – 6 pm	18	9.0%	3,130	10.3%
6 pm – 7 pm	6	3.0%	1,016	3.3%
Total	**200**	**100.0%**	**30,451**	**100.0%**

The safety belt use rate can be described by the overall use rate, as well as by vehicle type and various demographics. It should be noted the overall safety belt use rates presented in Table 7 and Tables 9 through 15 represent the raw (un-weighted) safety belt use data. These rates vary from the weighted post-CIOT use rate presented in Table 6. Table 9 summarizes the post-CIOT driver and front-seat passenger safety belt use rates by county and belt-use stratum. Because of the relatively low number of sites and/or observations in many counties, the safety belt use rates listed may not be fully representative of each county, particularly for counties with fewer than 30 observations.

Table 9. Post-CIOT Safety Belt Use Rates by Stratum and County

STRATUM 1	Actual Total No. of Observations	Actual Belted No. of Observations	% Safety Belt Use
Ingham County	1,815	1,758	96.9%
Kalamazoo County	1,880	1,771	94.2%
Oakland County	2,933	2,728	93.0%
Washtenaw County	1,455	1,394	95.8%
Total	**8,083**	**7,651**	**94.7%**
STRATUM 2	Actual Total No. of Observations	Actual Belted No. of Observations	% Safety Belt Use
Allegan County	752	718	95.5%
Bay County	447	429	96.0%
Calhoun County	543	498	91.7%
Eaton County	955	913	95.6%
Grand Traverse County	659	634	96.2%
Jackson County	980	918	93.7%
Kent County	1,507	1,466	97.3%
Livingston County	501	497	99.2%
Midland County	163	148	90.8%
Monroe County	684	655	95.8%
Ottawa County	470	453	96.4%
Total	**7,661**	**7,329**	**95.7%**
STRATUM 3	Actual Total No. of Observations.	Actual Belted No. of Observations	% Safety Belt Use
Berrien County	466	442	94.8%
Branch County	92	88	95.7%
Clare County	328	316	96.3%
Genesee County	281	264	94.0%
Ionia County	49	45	91.8%
Lapeer County	67	60	89.6%
Lenawee County	426	403	94.6%
Montcalm County	807	771	95.5%
Muskegon County	434	424	97.7%
Newaygo County	673	640	95.1%
Saginaw County	1,052	984	93.5%
Sanilac County	863	772	89.5%
Shiawassee County	364	346	95.1%
St. Clair County	878	795	90.5%
St. Joseph County	428	392	91.6%
Van Buren County	27	27	100.0%
Total	**7,235**	**6,769**	**93.6%**
STRATUM 4	Actual Total No. of Observations	Actual Belted No. of Observations	% Safety Belt Use
Macomb County	2,943	2,713	92.2%
Wayne County	4,529	4,183	92.4%
Total	**7,472**	**6,896**	**92.3%**
Grand Total (Unweighted)	**30,451**	**28,645**	**94.1%**

Stratum 2 displayed the highest safety belt use rate, followed closely by Strata 1 and 3. Stratum 4 displayed the lowest safety belt use rate at 92.3 percent. Tables 10 through 14 summarize occupant safety belt use for drivers and front-seat passengers by vehicle type for each day of the week, time of the day, gender, age, and race for the Post-CIOT Observation Survey.

Table 10. All Vehicles Post-CIOT Belt Use Summary

Day of the Week	All Vehicle Safety Belt Use		
	Actual Total No. of Observations	Actual Belted No. of Observations	% Safety Belt Use
Sunday	2,898	2,677	92.4%
Monday	3,341	3,115	93.2%
Tuesday	3,320	3,109	93.6%
Wednesday	4,061	3,813	93.9%
Thursday	5,225	4,958	94.9%
Friday	4,797	4,549	94.8%
Saturday	6,809	6,424	94.3%
Total	**30,451**	**28,645**	**94.1%**
Time of the Day	Actual Total No. of Observations	Actual Belted No. of Observations	% Safety Belt Use
7 am – 8 am	1,068	1,004	94.0%
8 am – 9 am	1,805	1,708	94.6%
9 am – 10 am	1,798	1,663	92.5%
10 am – 11 am	4,073	3,857	94.7%
11 am – 12 pm	3,063	2,894	94.5%
12 pm – 1 pm	2,838	2,643	93.1%
1 pm – 2 pm	3,290	3,104	94.3%
2 pm – 3 pm	2,894	2,690	93.0%
3 pm – 4 pm	2,910	2,749	94.5%
4 pm – 5 pm	2,566	2,411	94.0%
5 pm – 6 pm	3,130	2,978	95.1%
6 pm – 7 pm	1,016	944	92.9%
Total	**30,451**	**28,645**	**94.1%**
Vehicle Type	Actual Total No. of Observations	Actual Belted No. of Observations	% Safety Belt Use
Passenger Cars	11,582	10,888	94.0%
Sport Utility Vehicles	10,318	9,872	95.7%
Vans/Minivans	3,208	3,047	95.0%
Pick-Up Trucks	5,343	4,838	90.5%
Total	**30,451**	**28,645**	**94.1%**
Gender	Actual Total No. of Observations	Actual Belted No. of Observations	% Safety Belt Use
Male	16,379	15,167	92.6%
Female	13,981	13,393	95.8%
Unknown	91	85	93.4%
Total	**30,451**	**28,645**	**94.1%**
Age	Actual Total No. of Observations	Actual Belted No. of Observations	% Safety Belt Use
0 - 15	586	559	95.4%
16 - 29	6,961	6,434	92.4%
30 - 59	18,886	17,791	94.2%
60+	3,981	3,826	96.1%
Unknown	37	35	94.6%
Total	**30,451**	**28,645**	**94.1%**
Race	Actual Total No. of Observations	Actual Belted No. of Observations	% Safety Belt Use
Caucasian	26,172	24,672	94.3%
African-American	3,159	2,907	92.0%
Other	981	944	96.2%
Unknown	139	122	87.8%
Total	**30,451**	**28,645**	**94.1%**

Table 11. Passenger Cars Post-CIOT Belt Use Summary

Passenger Cars Safety Belt Use			
Day of the Week	Actual Total No. of Observations	Actual Belted No. of Observations	% Safety Belt Use
Sunday	1,211	1,118	92.3%
Monday	1,259	1,164	92.5%
Tuesday	1,274	1,198	94.0%
Wednesday	1,515	1,430	94.4%
Thursday	1,986	1,887	95.0%
Friday	1,613	1,536	95.2%
Saturday	2,724	2,555	93.8%
Total	**11,582**	**10,888**	**94.0%**
Time of the Day	Actual Total No. of Observations	Actual Belted No. of Observations	% Safety Belt Use
7 am – 8 am	410	388	94.6%
8 am – 9 am	667	627	94.0%
9 am – 10 am	680	631	92.8%
10 am – 11 am	1,527	1,439	94.2%
11 am – 12 pm	1,031	974	94.5%
12 pm – 1 pm	1,187	1,104	93.0%
1 pm – 2 pm	1,234	1,160	94.0%
2 pm – 3 pm	1,122	1,040	92.7%
3 pm – 4 pm	1,124	1,061	94.4%
4 pm – 5 pm	981	923	94.1%
5 pm – 6 pm	1,223	1,170	95.7%
6 pm – 7 pm	396	371	93.7%
Total	**11,582**	**10,888**	**94.0%**
Gender	Actual Total No. of Observations	Actual Belted No. of Observations	% Safety Belt Use
Male	5,883	5,452	92.7%
Female	5,662	5,400	95.4%
Unknown	37	36	97.3%
Total	**11,582**	**10,888**	**94.0%**
Age	Actual Total No. of Observations	Actual Belted No. of Observations	% Safety Belt Use
0 - 15	155	144	92.9%
16 - 29	3,542	3,275	92.5%
30 – 59	6,294	5,936	94.3%
60+	1,577	1,519	96.3%
Unknown	14	14	100.0%
Total	**11,582**	**10,888**	**94.0%**
Race	Actual Total No. of Observations	Actual Belted No. of Observations	% Safety Belt Use
Caucasian	9,403	8,864	94.3%
African-American	1,712	1,576	92.1%
Other	396	382	96.5%
Unknown	71	66	93.0%
Total	**11,582**	**10,888**	**94.0%**

Table 12. Sport Utility Vehicles Post-CIOT Belt Use Summary

Sport Utility Vehicles Safety Belt Use			
Day of the Week	Actual Total No. of Observations	Actual Belted No. of Observations	% Safety Belt Use
Sunday	992	938	94.6%
Monday	1,168	1,109	94.9%
Tuesday	1,088	1,026	94.3%
Wednesday	1,329	1,275	95.9%
Thursday	1,721	1,673	97.2%
Friday	1,609	1,545	96.0%
Saturday	2,411	2,306	95.6%
Total	**10,318**	**9,872**	**95.7%**
Time of the Day	Actual Total No. of Observations	Actual Belted No. of Observations	% Safety Belt Use
7 am – 8 am	410	390	95.1%
8 am – 9 am	656	632	96.3%
9 am – 10 am	565	546	96.6%
10 am – 11 am	1,404	1,346	95.9%
11 am – 12 pm	1,079	1,032	95.6%
12 pm – 1 pm	966	908	94.0%
1 pm – 2 pm	1,112	1,068	96.0%
2 pm – 3 pm	907	858	94.6%
3 pm – 4 pm	987	949	96.1%
4 pm – 5 pm	844	816	96.7%
5 pm – 6 pm	1,051	1,010	96.1%
6 pm – 7 pm	337	317	94.1%
Total	**10,318**	**9,872**	**95.7%**
Gender	Actual Total No. of Observations	Actual Belted No. of Observations	% Safety Belt Use
Male	4,486	4,253	94.8%
Female	5,800	5,590	96.4%
Unknown	32	29	90.6%
Total	**10,318**	**9,872**	**95.7%**
Age	Actual Total No. of Observations	Actual Belted No. of Observations	% Safety Belt Use
0 - 15	242	230	95.0%
16 - 29	1,984	1,885	95.0%
30 – 59	6,696	6,401	95.6%
60+	1,382	1,343	97.2%
Unknown	14	13	92.9%
Total	**10,318**	**9,872**	**95.7%**
Race	Actual Total No. of Observations	Actual Belted No. of Observations	% Safety Belt Use
Caucasian	8,929	8,571	96.0%
African-American	1,007	937	93.0%
Other	336	329	97.9%
Unknown	46	35	76.1%
Total	**10,318**	**9,872**	**95.7%**

Table 13. Van/Minivan Post-CIOT Belt Use Summary

Van/Minivans Safety Belt Use			
Day of the Week	Actual Total No. of Observations	Actual Belted No. of Observations	% Safety Belt Use
Sunday	312	286	91.7%
Monday	389	364	93.6%
Tuesday	325	309	95.1%
Wednesday	433	419	96.8%
Thursday	537	507	94.4%
Friday	500	474	94.8%
Saturday	712	688	96.6%
Total	**3,208**	**3,047**	**95.0%**
Time of the Day	Actual Total No. of Observations	Actual Belted No. of Observations	% Safety Belt Use
7 am – 8 am	91	88	96.7%
8 am – 9 am	200	192	96.0%
9 am – 10 am	213	195	91.5%
10 am – 11 am	437	422	96.6%
11 am – 12 pm	357	341	95.5%
12 pm – 1 pm	301	286	95.0%
1 pm – 2 pm	354	339	95.8%
2 pm – 3 pm	299	278	93.0%
3 pm – 4 pm	298	287	96.3%
4 pm – 5 pm	249	231	92.8%
5 pm – 6 pm	293	280	95.6%
6 pm – 7 pm	116	108	93.1%
Total	**3,208**	**3,047**	**95.0%**
Gender	Actual Total No. of Observations	Actual Belted No. of Observations	% Safety Belt Use
Male	1,782	1,667	93.5%
Female	1,413	1,368	96.8%
Unknown	13	12	92.3%
Total	**3,208**	**3,047**	**95.0%**
Age	Actual Total No. of Observations	Actual Belted No. of Observations	% Safety Belt Use
0 - 15	92	91	98.9%
16 - 29	498	467	93.8%
30 – 59	2,212	2,100	94.9%
60+	398	382	96.0%
Unknown	8	7	87.5%
Total	**3,208**	**3,047**	**95.0%**
Race	Actual Total No. of Observations	Actual Belted No. of Observations	% Safety Belt Use
Caucasian	2,834	2,700	95.3%
African-American	252	228	90.5%
Other	110	107	97.3%
Unknown	12	12	100.0%
Total	**3,208**	**3,047**	**95.0%**

Table 14. Pick-Up Trucks Post-CIOT Belt Use Summary

Pick-up Truck Safety Belt Use			
Day of the Week	Actual Total No. of Observations	Actual Belted No. of Observations	% Safety Belt Use
Sunday	383	335	87.5%
Monday	525	478	91.0%
Tuesday	633	576	91.0%
Wednesday	784	689	87.9%
Thursday	981	891	90.8%
Friday	1,075	994	92.5%
Saturday	962	875	91.0%
Total	**5,343**	**4,838**	**90.5%**
Time of the Day	Actual Total No. of Observations	Actual Belted No. of Observations	% Safety Belt Use
7 am – 8 am	157	138	87.9%
8 am – 9 am	282	257	91.1%
9 am – 10 am	340	291	85.6%
10 am – 11 am	705	650	92.2%
11 am – 12 pm	596	547	91.8%
12 pm – 1 pm	384	345	89.8%
1 pm – 2 pm	590	537	91.0%
2 pm – 3 pm	566	514	90.8%
3 pm – 4 pm	501	452	90.2%
4 pm – 5 pm	492	441	89.6%
5 pm – 6 pm	563	518	92.0%
6 pm – 7 pm	167	148	88.6%
Total	**5,343**	**4,838**	**90.5%**
Gender	Actual Total No. of Observations	Actual Belted No. of Observations	% Safety Belt Use
Male	4,228	3,795	89.8%
Female	1,106	1,035	93.6%
Unknown	9	8	88.9%
Total	**5,343**	**4,838**	**90.5%**
Age	Actual Total No. of Observations	Actual Belted No. of Observations	% Safety Belt Use
0 - 15	97	94	96.9%
16 - 29	937	807	86.1%
30 – 59	3,684	3,354	91.0%
60+	624	582	93.3%
Unknown	1	1	100.0%
Total	**5,343**	**4,838**	**90.5%**
Race	Actual Total No. of Observations	Actual Belted No. of Observations	% Safety Belt Use
Caucasian	5,006	4,537	90.6%
African-American	188	166	88.3%
Other	139	126	90.6%
Unknown	10	9	90.0%
Total	**5,343**	**4,838**	**90.5%**

Occupants of sport utility vehicles exhibited the highest safety belt use rate among vehicle types at 95.7 percent, followed closely by occupants of vans or minivans at 95.0 percent. Occupants of passenger cars exhibited a use rate of 94.0 percent, while occupants of pick-up trucks exhibited the lowest use rate at 90.5 percent; consistent with historical trends. Considering days of the week, Sundays demonstrated the lowest safety belt usage rate with 92.4 percent. Safety belt use rates were highest on Thursdays with a rate of 94.9 percent. The time period of 9:00 AM to 10:00 AM exhibited a lower usage rate than all other times of the day (92.5 percent), while occupants were most likely to wear their safety belts between the hours of 5:00 PM to 6:00 PM (95.1 percent).

Female occupants had higher use rates than male occupants by 3.2 percent (95.8 percent use rate for females vs. 92.6 percent use rate for males). The safety belt usage rate was highest among occupants age 60 and older at 96.1 percent and lowest for occupants between the ages of 16 to 29 (92.4 percent). The safety belt use rate for occupants age 0 to 15 was found to be 95.4 percent while the use rate was 94.2 percent among occupants between the ages of 30 and 59. Considering occupant races, the safety belt use rate was found to be lowest among African American occupants (92.0 percent) and highest for individuals of 'other' races (96.2 percent) which includes individuals of Asian descent and Pacific Islanders. Caucasian occupants were found to have a safety belt use rate of 94.3 percent.

Table 15 summarizes occupant safety belt use rates by gender, age, and race. Vehicle occupants whose gender could not be identified were excluded from this demographic comparison. Young African American males ages 0 to 15 and 16 to 29, exhibited the lowest belt use rates of all demographic groups with use rates of 86.2 percent and 89.3 percent, respectively. However it should be noted that the sample sizes for these groups were relatively small. Similar to previous findings, Caucasian females of all ages generally exhibited the highest safety belt use rates compared with other demographics. Overall, young male pick-up truck occupants exhibited the lowest safety belt use rates, consistent with past findings.

Table 15. Post-CIOT Belt Use by Demographic Characteristics

Demographic Data			All Vehicles Safety Belt Use		
Gender	**Age**	**Race**	**Actual Total No. of Observations**	**Actual Belted No. of Observations**	**% Safety Belt Use**
Male	0 - 15	Caucasian	264	253	95.8%
		African- American	29	25	86.2%
		Other	9	9	100.0%
		Unknown	1	1	100.0%
		Total	**303**	**288**	**95.0%**
	16 - 29	Caucasian	2,840	2,556	90.0%
		African- American	392	350	89.3%
		Other	174	167	96.0%
		Unknown	18	17	94.4%
		Total	**3,424**	**3,090**	**90.2%**
	30 - 59	Caucasian	8,937	8,315	93.0%
		African-American	1,057	954	90.3%
		Other	379	362	95.5%
		Unknown	49	40	81.6%
		Total	**10,422**	**9,671**	**92.8%**
	60+	Caucasian	2,138	2,028	94.9%
		African- American	65	63	96.9%
		Other	14	14	100.0%
		Unknown	4	4	100.0%
		Total	**2,221**	**2,109**	**95.0%**
	Unknown	Caucasian	8	8	100.0%
		African- American	1	1	100.0%
		Other	0	0	N/A
		Unknown	0	0	N/A
		Total	9	9	100.0%
	TOTAL		**16,370**	**15,158**	**92.6%**

Table 15. Post-CIOT Belt Use by Demographic Characteristics (Continued)

Demographic Data			All Vehicles Safety Belt Use		
Gender	**Age**	**Race**	**Actual Total No. of Observations**	**Actual Belted No. of Observations**	**% Safety Belt Use**
Female	0 - 15	Caucasian	236	226	95.8%
		African- American	23	22	95.7%
		Other	9	9	100.0%
		Unknown	4	3	75.0%
		Total	**272**	**260**	**95.6%**
	16 - 29	Caucasian	2,915	2,766	94.9%
		African- American	482	444	92.1%
		Other	109	105	96.3%
		Unknown	14	13	92.9%
		Total	**3,520**	**3,328**	**94.5%**
	30 - 59	Caucasian	7,106	6,833	96.2%
		African- American	1,031	972	94.3%
		Other	271	263	97.0%
		Unknown	21	19	90.5%
		Total	**8,429**	**8,087**	**95.9%**
	60+	Caucasian	1,671	1,632	97.7%
		African- American	66	64	97.0%
		Other	13	13	100.0%
		Unknown	3	3	100.0%
		Total	**1,753**	**1,712**	**97.7%**
	Unknown	Caucasian	4	4	100.0%
		African- American	1	1	100.0%
		Other	2	1	50.0%
		Unknown	0	0	N/A
		Total	**7**	**6**	**85.7%**
	TOTAL		**13,981**	**13,393**	**95.8%**

In comparison to 2016, the 2017 Post-CIOT survey revealed a slight decrease in safety belt usage from 94.5 percent to 94.0 percent. In any case, continued public awareness and enforcement efforts are warranted to increase safety belt use. The careful evaluation of these media and enforcement efforts will allow for the identification of at-risk vehicle occupants and geographic areas prone to low belt use rates. As shown in this study, young males and pick-up truck drivers continue to exhibit lower safety belt use rates. Generally, belt use was also lower for those counties in Stratum 4. These areas should be emphasized in subsequent program efforts.

7.2 Mobile Device Use Results and Conclusions

As a part of the 2017 Post-CIOT observational survey of safety belt use, mobile device use was also recorded for drivers only (passengers were not observed for mobile device use). A total of 1,617 drivers were observed using mobile device in some way and the overall weighted mobile device use rate was found to be 6.9 percent. The weighted mobile device use rate (shown in Table 16) was calculated using the same procedure as the weighted safety belt rate described in the "Data Analysis" section of the report. This rate represents a 0.6 percent decrease from the 7.5 percent mobile device use rate observed in Michigan in 2016. Nationally, the overall mobile device use rate by drivers was found to be 5.9 percent in 2016 [7], which included hand-held talking, hands-free talking (earpiece observed), and typing, although hands-free devices with no earpiece observed were not included. Even when excluding drivers talking where no earpiece was observed, Michigan's adjusted mobile device use rate of 6.7 percent, remains higher than the national average of 5.9 percent. Furthermore, both hand-held talking and typing rates were higher in Michigan compared to nationwide [7]. Table 17 presents overall driver mobile device use, in addition to mobile device use by device type and type of use.

Table 16. Post-CIOT Weighted Mobile Device Use Rate for Drivers

Use by Category	Use Rate*	Standard Error
Overall Mobile Device Use	**6.9% ± 0.6%**	**0.3%**

* Weighted Mobile Device Usage ± 95% Confidence Band

Table 17. Post-CIOT Unweighted Mobile Device Use Rates by Use Type

Use by Category	Total # of Driver Observations	Total # of Drivers Observed Using Mobile Device	Percent of Mobile Device Use by Type (Drivers)
Talking – Hand-held Device	24,398	938	3.8%
Talking – Hands-free Device (Earpiece Observed)	24,398	75	0.3%
Talking – Hands-free Device (Earpiece Not Observed)	24,398	54	0.2%
Typing – Hand-held	24,398	550	2.3%
Overall Mobile Device Use	**24,398**	**1,617**	**6.6%**

Table 18 summarizes mobile device use for drivers in terms of day of the week, time of the day, vehicle type, gender, age and race. Females were found to be more likely to use a mobile device while driving than males (7.7 percent and 5.9 percent, respectively). The electronic device use rate was found to be highest between 3:00 pm and 4:00 pm at 7.7 percent, while the mobile device use rate was lowest between 7:00 am and 8:00 am and 2:00 pm and 3:00 pm (both with 5.5 percent). Mobile device use

among drivers less than 30 years of age was greatest at 9.9 percent, in comparison to 6.4 percent among those between ages 30 and 59 and 2.2 percent for drivers age 60 and above. Additionally, African American drivers tended to exhibit higher mobile device use rates while driving as compared to other demographics.

Table 18. Post-CIOT Mobile Device Use Summary

Day of the Week	All Vehicles Mobile Device Use		
	Total No. of Driver Observations	Total No. of Drivers Observed Using Mobile Device	Percent of Mobile Device Use (Drivers)
Sunday	2,224	109	4.9%
Monday	2,871	227	7.9%
Tuesday	2,765	216	7.8%
Wednesday	3,313	230	6.9%
Thursday	4,463	331	7.4%
Friday	3,692	209	5.7%
Saturday	5,070	295	5.8%
Total	**24,398**	**1,617**	**6.6%**
Time of the Day	**All Vehicles Mobile Device Use**		
	Total No. of Driver Observations	**Total No. of Drivers Observed Using Mobile Device**	**Percent of Mobile Device Use (Drivers)**
7 am - 8 am	992	55	5.5%
8 am - 9 am	1,579	98	6.2%
9 am - 10 am	1,513	100	6.6%
10 am - 11 am	3,274	211	6.4%
11 am - 12 pm	2,405	149	6.2%
12 pm - 1 pm	2,227	154	6.9%
1 pm - 2 pm	2,634	170	6.5%
2 pm - 3 pm	2,282	125	5.5%
3 pm - 4 pm	2,273	174	7.7%
4 pm - 5 pm	2,018	154	7.6%
5 pm - 6 pm	2,399	170	7.1%
6 pm - 7 pm	802	57	7.1%
Total	**24,398**	**1,617**	**6.6%**

Table 18. Post-CIOT Mobile Device Use Summary (Continued)

Vehicle Type	All Vehicles Mobile Device Use		
	Total No. of Driver Observations	Total No. of Drivers Observed Using Mobile Device	Percent of Mobile Device Use (Drivers)
Passenger Cars	9,447	648	6.9%
Sport Utility Vehicles	8,185	523	6.4%
Vans/ Minivans	2,457	177	7.2%
Pick-Up Trucks	4,309	269	6.2%
Total	**24,398**	**1,617**	**6.6%**
Gender	**All Vehicles Mobile Device Use**		
	Total No. of Driver Observations	**Total No. of Drivers Observed Using Mobile Device**	**Percent of Mobile Device Use (Drivers)**
Male	14,194	831	5.9%
Female	10,147	783	7.7%
Unknown	57	3	5.3%
Total	**24,398**	**1,617**	**6.6%**
Age	**All Vehicles Mobile Device Use**		
	Total No. of Driver Observations	**Total No. of Drivers Observed Using Mobile Device**	**Percent of Mobile Device Use (Drivers)**
16-29	5,295	523	9.9%
30-59	16,051	1,026	6.4%
60+	3,029	67	2.2%
Unknown	23	1	4.3%
Total	**24,398**	**1,617**	**6.6%**
Race	**All Vehicles Mobile Device Use**		
	Total No. of Driver Observations	**Total No. of Drivers Observed Using Mobile Device**	**Percent of Mobile Device Use (Drivers)**
Caucasian	20,941	1,311	6.3%
African American	2,558	249	9.7%
Other	793	47	5.9%
Unknown	106	10	9.4%
Total	**24,398**	**1,617**	**6.6%**

8.0 STATEWIDE SURVEY RESULTS

Observation surveys were also recorded at 144 intersection sites across all 83 counties in Michigan. All data were collected between May 30 and June 29, 2017. Data were only collected on secondary roadways (MTFCC S1200 designation) and during weekdays between the hours of 7:00 AM and 8:00 PM. At least one roadway per county was observed and data were collected for at least 60 minutes and at least 50 total belt use observations per county. Multiple approaches were observed at study locations where conditions and human resources allowed, as long as the observed roadways were classified as secondary. Data collected during the Post-CIOT safety belt observations were utilized for the 33 applicable counties as long as the roadway and day-of-week criteria were met. Table 19 presents the results of the statewide sample including county, number of observation sites, number of driver observations, driver percent belt use, number of passenger observations, passenger percent belt use, total observations, total percent belt use, and percent driver mobile device use. Overall statewide use rates were computed for each statistic weighted by the total county vehicle miles traveled (VMT). The county VMT data used for the data weighting process are presented in the Appendix V.

Table 19. Statewide Survey Results by County and Occupant Type

County	Number of Study Sites	Number of Driver Obs.	Driver % Belt Use	Number of Passenger Obs.	Passenger % Belt Use	Number of Total Obs.	Total % Belt Use	Driver % Mobile Device Use
Alcona	1	36	94.4%	15	100.0%	51	96.1%	**16.7%**
Alger	1	43	86.0%	14	92.9%	57	**87.7%**	0.0%
Allegan	3	541	96.3%	144	91.7%	685	95.3%	3.8%
Alpena	1	125	92.8%	38	97.4%	163	93.9%	**12.0%**
Antrim	1	193	94.8%	73	93.2%	266	94.4%	2.6%
Arenac	1	239	87.4%	85	90.6%	324	**88.3%**	5.0%
Baraga	1	143	75.5%	58	69.0%	201	**73.6%**	4.2%
Barry	1	195	93.8%	48	91.7%	243	93.4%	6.2%
Bay	2	252	96.4%	70	97.1%	322	96.6%	4.3%
Benzie	1	256	93.8%	88	96.6%	344	94.5%	3.9%
Berrien	1	195	87.7%	113	94.7%	308	90.3%	4.6%
Branch	1	268	94.8%	67	91.0%	335	94.0%	6.7%
Calhoun	1	137	95.6%	34	94.1%	171	95.3%	5.0%
Cass	1	156	90.4%	45	88.9%	201	90.0%	5.6%
Charlevoix	1	251	92.8%	106	97.2%	357	94.1%	5.2%
Cheboygan	2	153	93.5%	51	92.2%	204	93.1%	5.2%
Chippewa	1	114	93.9%	75	94.7%	189	94.2%	1.8%
Clare	1	135	93.3%	40	95.0%	175	93.7%	6.7%
Clinton	1	172	95.3%	36	97.2%	208	95.7%	5.8%
Crawford	1	180	92.2%	64	90.6%	244	91.8%	9.4%
Delta	1	91	93.4%	26	100.0%	117	94.9%	9.9%
Dickinson	1	221	90.5%	59	88.1%	280	90.0%	7.2%
Eaton	3	416	94.2%	94	93.6%	510	94.1%	8.2%
Emmet	1	225	96.5%	96	95.9%	321	96.3%	8.4%
Genesee	1	157	89.8%	23	91.3%	180	90.0%	**10.1%**
Gladwin	1	206	88.3%	69	92.8%	275	**89.5%**	3.8%
Gogebic	1	103	94.2%	44	93.2%	147	93.9%	0.0%

Table 19. Statewide Survey Results by County and Occupant Type (Continued)

County	Number of Study Sites	Number of Driver Obs.	Driver % Belt Use	Number of Passenger Obs.	Passenger % Belt Use	Number of Total Obs.	Total % Belt Use	Driver % Mobile Device Use
Grand Traverse	2	507	96.3%	152	96.1%	659	96.2%	3.4%
Gratiot	1	149	94.0%	44	95.5%	193	94.3%	7.4%
Hillsdale	1	168	94.6%	48	85.4%	216	92.6%	8.9%
Houghton	1	196	93.9%	55	89.1%	251	92.8%	3.5%
Huron	2	303	83.5%	60	83.3%	363	**83.5%**	6.1%
Ingham	6	998	97.3%	148	98.6%	1146	97.5%	**10.2%**
Ionia	1	146	89.7%	41	90.2%	187	**89.8%**	4.1%
Iosco	1	121	87.6%	39	79.5%	160	**85.6%**	9.9%
Iron	1	167	92.2%	38	92.1%	205	92.2%	5.9%
Isabella	1	113	92.9%	37	91.9%	150	92.7%	0.9%
Jackson	3	513	94.0%	134	87.3%	647	92.6%	6.0%
Kalamazoo	2	255	90.2%	71	93.0%	326	90.8%	4.7%
Kalkaska	1	202	96.0%	74	97.3%	276	96.4%	1.5%
Kent	1	113	98.2%	32	100.0%	145	98.6%	**10.6%**
Keweenaw	1	130	88.5%	43	90.7%	173	**89.0%**	1.5%
Lake	1	68	94.1%	22	100.0%	90	95.6%	1.5%
Lapeer	1	52	90.4%	15	86.7%	67	**89.6%**	7.7%
Leelanau	1	134	96.3%	67	95.5%	201	96.0%	2.2%
Lenawee	3	325	96.0%	81	88.9%	406	94.6%	5.5%
Livingston	1	177	98.9%	18	100.0%	195	99.0%	7.3%
Luce	1	173	95.4%	77	98.7%	250	96.4%	2.9%
Mackinac	1	77	98.7%	28	96.4%	105	98.1%	2.6%
Macomb	9	1166	93.1%	214	89.3%	1380	92.5%	7.5%
Manistee	1	196	92.9%	73	97.3%	269	94.1%	5.1%
Marquette	1	214	94.9%	69	95.7%	283	95.1%	6.0%
Mason	1	156	94.9%	42	95.2%	198	94.9%	1.3%
Mecosta	1	130	93.8%	34	100.0%	164	95.1%	4.6%
Menominee	1	161	94.4%	57	93.0%	218	94.0%	6.7%
Midland	1	98	88.8%	28	89.3%	126	**88.9%**	7.7%
Missaukee	1	83	98.8%	27	100.0%	110	99.1%	4.8%
Monroe	3	472	96.0%	120	96.7%	592	96.1%	8.4%
Montcalm	4	619	95.0%	188	97.3%	807	95.5%	5.2%
Montmorency	1	124	95.2%	63	95.2%	187	95.2%	8.1%
Muskegon	1	147	97.3%	56	96.4%	203	97.0%	6.8%
Newaygo	4	484	94.4%	189	96.8%	673	95.1%	4.7%
Oakland	10	1359	93.9%	172	90.7%	1531	93.5%	7.5%
Oceana	1	143	98.6%	59	96.6%	202	98.0%	1.4%
Ogemaw	1	165	93.9%	67	94.0%	232	94.0%	3.5%
Ontonagon	1	129	92.2%	47	95.7%	176	93.2%	1.5%
Osceola	1	188	94.7%	59	94.9%	247	94.7%	5.9%
Oscoda	1	160	96.9%	63	87.3%	223	94.2%	**13.8%**
Otsego	1	170	91.2%	51	92.2%	221	91.4%	**11.8%**
Ottawa	1	76	89.5%	21	95.2%	97	90.7%	**14.5%**

Table 19. Statewide Survey Results by County and Occupant Type (Continued)

County	Number of Study Sites	Number of Driver Obs.	Driver % Belt Use	Number of Passenger Obs.	Passenger % Belt Use	Number of Total Obs.	Total % Belt Use	Driver % Mobile Device Use
Presque Isle	1	88	87.5%	29	89.7%	117	**88.0%**	8.0%
Roscommon	1	169	92.9%	54	90.7%	223	92.4%	2.9%
Saginaw	5	524	92.2%	118	89.0%	642	91.6%	5.5%
Sanilac	5	674	89.0%	189	91.0%	863	**89.5%**	7.6%
Schoolcraft	1	81	97.5%	37	100.0%	118	98.3%	2.5%
Shiawassee	1	207	95.2%	56	87.5%	263	93.5%	9.1%
St Clair	3	411	89.3%	70	94.3%	481	90.0%	6.9%
St Joseph	1	203	96.6%	60	95.0%	263	96.2%	5.3%
Tuscola	2	290	88.6%	72	91.7%	362	**89.2%**	5.7%
Van Buren	1	129	95.3%	13	92.3%	142	95.1%	6.9%
Washtenaw	5	674	95.4%	92	94.6%	766	95.3%	6.2%
Wayne	4	601	91.8%	107	85.0%	708	90.8%	9.1%
Wexford	1	149	94.6%	53	100.0%	202	96.0%	8.1%
ALL	**144**	**20,930**	**93.5%**	**5,648**	**92.0%**	**26,578**	**93.3%**	**7.5%**

Table 19 presents several interesting findings. First, the weighted 83-county safety belt use rate was 93.3 percent, which was 0.7 percentage points lower than the 33-county post-CIOT survey. This decrease from the post-CIOT survey is likely due to the inclusion of the addition of 50 generally rural counties in Michigan. Such counties have historically shown the lowest belt use rates, particularly by young males in pick-up trucks, which are prevalent in these areas. Thirteen (13) counties showed total safety belt use rates that were below 90 percent, which are indicated in boldface in Table 19. The counties with the lowest belt use rates were almost exclusively rural counties in the upper peninsula, northeast lower peninsula, and the thumb area.

Driver mobile device use in the 83-county survey was found to be 7.5 percent, which is 0.6 percentage points higher than the 33-county post-CIOT survey. Eight (8) counties showed driver mobile device use rates that were above 10 percent, which are also indicated in boldface in Table 19. The counties with the highest mobile device use rates included both rural and urban counties and did not show a clear regional or demographic pattern.

REFERENCES

1. Early Estimate of Motor Vehicle Traffic Fatalities for the First Half (Jan-Jun) of 2016. Rep. no. DOT HS 812 332. Washington DC: National Highway Traffic Safety Administration, 2016.
2. NHTSA's National Center for Statistics and Analysis, "Traffic Safety Facts - 2015 Data – Occupant Protection", U.S. Department of Transportation, NHTSA, DOT HS 812 374, February 2017.
3. Blincoe, L. J., Miller, T. R., Zaloshnja, E., Lawrence, B. A. The Economic and Societal Impact of Motor Vehicle Crashes, 2010 (Revised). Washington, DC: National Highway Traffic Safety Administration, 2015.
4. Seat Belt Use in 2016 – Overall results. (Traffic Safety Facts Research Note. Report No. DOT HS 812 351). Washington, DC: National Highway Traffic Safety Administration, 2017.
5. Seat Belt Use in 2016 - Use Rates in the States and Territories. Rep. no. DOT HS 812 417. Washington DC: National Highway Traffic Safety Administration, 2017.
6. National Highway Traffic Safety Administration, *An Example of a Compliant State Seat Belt Use Survey Design*, DOT HS 811 494, June 2011.
7. Driver Electronic Device Use in 2016. (Traffic Safety Facts Research Note. Report No. DOT HS 812 426). Washington, DC: National Highway Traffic Safety Administration, 2017.

APPENDIX I
Michigan Safety Belt Survey Cover Sheet and Data Collection Form

DIRECT OBSERVATION SURVEY COVER SHEET

Date: _____ - _____ - 2017 **Observer's Name:_____**

Site Identification:

Site Location: _____

Site Number:_____

City_____County_____Stratum_____

Alternate Site Information:

Is this an alternate site? No Yes
(Circle one)

If yes, please provide a reason for using an alternate site from the reserve list:

_____

Site Description:

Observation direction: Northbound Southbound Eastbound Westbound

Number of lanes observed: _____

Total number of lanes in this direction: _____

Weather Conditions: Clear Light Fog Light Rain

Site Start and End Time:

Start time: _____am/pm **End time: _____am/pm**

Sample Size

60 Minute Volume Count (for lanes being observed): _____Vehicles

Number of Observations Recorded in 60 min: _____Vehicles

OBSERVATION DATA COLLECTION SHEET

SITE #________ OBSERVATION No.'s____ - ____ PAGE #_______

VEHICLE TYPE:			
□Passenger Car	□SUV	□Van/Minivan	□Pickup Truck
OBSERVABLE?	**VEHICLE USE:**	**DRIVER CELL PHONE USE**	
□Vehicle NOT Observable	□Non-Commercial □Commercial	□Handheld (Talking) □Handheld (Typing)	□Hands-free (E.P.) □Hands-free (NO E.P.)
DRIVER			
BELT USE:	**AGE:**	**GENDER:**	**RACE:**
□Belted	□16-29	□Male	□White
□Not Belted	□30-59	□Female	□Black
□Unknown	□60+	□Unknown	□Other
	□Unknown		□Unknown
□No Passenger	**PASSENGER**		
BELT USE:	**AGE:**	**GENDER:**	**RACE:**
□Belted	□0 to 15	□Male	□White
□Not Belted	□16-29	□Female	□Black
□Unknown	□30-59	□Unknown	□Other
	□60+		□Unknown
	□Unknown		

VEHICLE TYPE:			
□Passenger Car	□SUV	□Van/Minivan	□Pickup Truck
OBSERVABLE?	**VEHICLE USE:**	**DRIVER CELL PHONE USE**	
□Vehicle NOT Observable	□Non-Commercial □Commercial	□Handheld (Talking) □Handheld (Typing)	□Hands-free (E.P.) □Hands-free (NO E.P.)
DRIVER			
BELT USE:	**AGE:**	**GENDER:**	**RACE:**
□Belted	□16-29	□Male	□White
□Not Belted	□30-59	□Female	□Black
□Unknown	□60+	□Unknown	□Other
	□Unknown		□Unknown
□No Passenger	**PASSENGER**		
BELT USE:	**AGE:**	**GENDER:**	**RACE:**
□Belted	□0 to 15	□Male	□White
□Not Belted	□16-29	□Female	□Black
□Unknown	□30-59	□Unknown	□Other
	□60+		□Unknown
	□Unknown		

VEHICLE TYPE:			
□Passenger Car	□SUV	□Van/Minivan	□Pickup Truck
OBSERVABLE?	**VEHICLE USE:**	**DRIVER CELL PHONE USE**	
□Vehicle NOT Observable	□Non-Commercial □Commercial	□Handheld (Talking) □Handheld (Typing)	□Hands-free (E.P.) □Hands-free (NO E.P.)
DRIVER			
BELT USE:	**AGE:**	**GENDER:**	**RACE:**
□Belted	□16-29	□Male	□White
□Not Belted	□30-59	□Female	□Black
□Unknown	□60+	□Unknown	□Other
	□Unknown		□Unknown
□No Passenger	**PASSENGER**		
BELT USE:	**AGE:**	**GENDER:**	**RACE:**
□Belted	□0 to 15	□Male	□White
□Not Belted	□16-29	□Female	□Black
□Unknown	□30-59	□Unknown	□Other
	□60+		□Unknown
	□Unknown		

Note: E.P. = Ear Piece

APPENDIX II
Resumes of Timothy J. Gates and Peter T. Savolainen

Dr. Timothy J. Gates

Summary

Dr. Timothy J. Gates is the current Principal Investigator of the Direct Observation Survey of Safety Belt Use. Dr. Gates is an Associate Professor in the Michigan State University (MSU) Department of Civil and Environmental Engineering. He has more than eight years of experience with direct observation surveys of safety restraint use. This includes a diverse range of experiences in sample design and selection, field data collection methods, observer training, statistical systems development, and optimization techniques. He also has expertise in the areas of survey research methodology, data processing, and statistical quality control.

Education

Ph.D., Civil Engineering, University of Wisconsin, 2007
M.A., Civil Engineering, Michigan State University, 2000
B.S., Civil Engineering, Michigan State University, 2000

Professional Associations

American Society of Civil Engineers
Institute of Transportation Engineers

Computer Skills

Operation Systems: Windows, iOs
Software: LIMDEP, SAS, SPSS, SUDAAN, Microsoft PowerPoint, Excel and Word

Relevant Project Experience

Wayne State University (2007 to Present)

Direct Observation Surveys of Seat Belt Use –PI or co-PI on OHSP-sponsored Michigan safety belt use survey from FY 2012 to present. Participated in proposal development, planning, survey implementation, data collection, quality control, data analysis, and report preparation.

Direct Observation Surveys of Commercial Motor Vehicle Seat Belt Use – Co-PI on OHSP-sponsored Michigan seat belt use survey for commercial motor vehicle occupants during FY 2012 and 2015.

Direct Observation Surveys of Child Restraint Device Use and Misuse (including Booster Seat Use) – PI or co-PI on OHSP-sponsored child restraint device use/misuse survey, including booster seats in FY 2009, 2011, 2013, and 2015.

Direct Observation Surveys of Motorcycle Helmet Use – co-PI on OHSP-sponsored motorcycle helmet use survey in FY 2013 and 2017.

Dr. Peter T. Savolainen

Summary

Dr. Peter T. Savolainen is an Associate Professor in the Iowa State University Department of Civil, Construction, and Environmental Engineering. Dr. Savolainen serves as the lead statistical advisor for this project. Prior to joining Iowa State University in 2014, he was an Associate Professor of Civil Engineering at Wayne State University. He has more than nine years of experience with direct observation surveys of safety restraint use. This includes a diverse range of experiences in sample design and selection, data weighting, imputation, variance estimation, statistical systems development, and optimization techniques. He also has expertise in the areas of survey research methodology, data processing, and statistical quality control. Dr. Savolainen also teaches graduate level courses on civil engineering research methods and applications, as well as statistics and econometric methods of data analysis. He is a proficient user of various statistical analysis software packages, including LIMDEP, SAS, SPSS, and SUDAAN.

Education

Ph.D., Civil Engineering, Purdue University, 2006
M.A., Civil Engineering, Purdue University, 2004
B.S., Civil Engineering, Michigan Technological University, 2002

Professional Associations

American Society of Civil Engineers
American Statistical Association
Institute of Transportation Engineers

Computer Skills

Operation Systems: Windows, iOs
Software: LIMDEP, SAS, SPSS, SUDAAN, Microsoft PowerPoint, Excel and Word

Relevant Project Experience

Wayne State University (2006 to Present)

Direct Observation Surveys of Seat Belt Use –PI or co-PI on OHSP-sponsored Michigan safety belt use survey from FY 2008 to 2010 and FY 2012 to present. Participated in proposal development, planning, survey implementation, data collection, quality control, data analysis, and report preparation.

Direct Observation Surveys of Commercial Motor Vehicle Seat Belt Use – Co-PI on OHSP-sponsored Michigan seat belt use survey for commercial motor vehicle occupants during FY 2012.

Direct Observation Surveys of Child Restraint Device Use and Misuse (including Booster Seat Use) – PI or co-PI on OHSP-sponsored child restraint device use/misuse survey, including booster seats in FY 2009, 2011, 2013, and 2015.

Direct Observation Surveys of Motorcycle Helmet Use – co-PI on OHSP-sponsored motorcycle helmet use survey in FY 2013.

APPENDIX III

List of Post-CIOT Observation Locations by County, Stratum, and Road Classification Including Belt Use Observation Data

Belt Use Stratum	County	Site Location	Site Type	Road Type	Actual Observations		Sample Weight
					Total	Belted	
1	Ingham	I-96 Bus and N Martin Luther King Jr Blvd	Original	Primary	186	179	118885.5
1	Ingham	E Saginaw St and Hagadorn Rd	Original	Primary	135	131	242058.7
1	Ingham	US Hwy 127 and N Cedar St	Original	Primary	180	180	62574.5
1	Kalamazoo	W Kalamazoo Ave and N Rose St	Original	Primary	182	169	78434.8
1	Kalamazoo	E Michigan Ave and N Edwards St	Original	Primary	249	240	189042.7
1	Kalamazoo	I-94 and Portage Rd	Original	Primary	250	231	72530.1
1	Kalamazoo	I-94 and S Kalamazoo St	Original	Primary	266	251	33817.9
1	Oakland	I-96 and 8 Mile Rd	Original	Primary	150	147	116079.6
1	Oakland	I-96 and Milford Rd	Original	Primary	192	167	51459.3
1	Oakland	I-696 and Orchard Lake Rd	Original	Primary	186	168	203089.4
1	Oakland	I-75 and Joslyn Rd	Original	Primary	188	175	138381.6
1	Washtenaw	I-94 and Kalmbach Rd	Original	Primary	21	18	30381.9
1	Washtenaw	US Hwy 12 and S Huron St	Original	Primary	146	142	158164.4
1	Washtenaw	US Hwy 12 and S Huron St	Original	Primary	241	238	126840.8
1	Washtenaw	I-94 Bus and N Maple Rd	Original	Primary	167	164	233349.5
1	Ingham	State Hwy 99 and W Holmes Rd	Original	Secondary	194	183	141476.9
1	Ingham	Lansing Rd and W Mt Hope Hwy	Original	Secondary	103	92	109478.4
1	Ingham	E Saginaw St and N Larch St	Original	Secondary	215	204	161779.4
1	Ingham	State Hwy 43 and Marsh Rd	Original	Secondary	171	168	147486.2
1	Ingham	S Martin Luther King Jr Blvd and W Jolly Rd	Original	Secondary	196	193	102078.8
1	Ingham	Eaton Rapids Rd and Bishop Rd	Original	Secondary	191	191	107459.6
1	Ingham	State Hwy 52 and N Clinton St	Original	Secondary	179	178	57176.4
1	Kalamazoo	State Hwy 43 and Solon St	Original	Secondary	261	248	162988.2
1	Kalamazoo	US Hwy 131 and W Centre Ave	Original	Secondary	115	112	45276.9
1	Kalamazoo	State Hwy 43 and M 40	Original	Secondary	231	224	151685.8
1	Kalamazoo	E Michigan Ave and 35th St N	Original	Secondary	283	255	77901.9
1	Kalamazoo	E C Ave and 32nd St N	Original	Secondary	43	41	35231.1
1	Oakland	Woodward Ave and W Big Beaver Rd	Original	Secondary	182	173	546615.4
1	Oakland	State Hwy 10 and W 13 Mile Rd	Original	Secondary	185	179	325773.0
1	Oakland	Telegraph Rd and W Long Lake Rd	Original	Secondary	153	134	121611.7
1	Oakland	State Hwy 15 and E Seymour Lake Rd	Original	Secondary	164	145	301661.1
1	Oakland	State Hwy 5 and W 8 Mile Rd	Original	Secondary	123	118	274860.6
1	Oakland	Telegraph Rd and W Maple Rd	Original	Secondary	165	158	292991.3
1	Oakland	Dixie Hwy and Williams Lake Rd	Original	Secondary	131	118	297136.0
1	Oakland	S Main St and E University Dr	Original	Secondary	146	136	284430.7
1	Oakland	State Hwy 150 and E Avon Rd	Original	Secondary	148	143	202505.2
1	Oakland	Lapeer Rd and Dutton Rd	Original	Secondary	134	128	250330.5
1	Oakland	State Hwy 59 and Hickory Ridge Rd	Original	Secondary	139	132	129758.5
1	Oakland	State Hwy 5 and W 13 Mile Rd	Original	Secondary	160	147	260721.2
1	Oakland	Woodward Ave and W 12 Mile Rd	Original	Secondary	161	154	255583.8
1	Washtenaw	US Hwy 23 and Washtenaw Ave	Original	Secondary	121	117	116026.9
1	Washtenaw	W Michigan Ave and N Ann Arbor St	Original	Secondary	105	98	159036.8
1	Washtenaw	Ann Arbor Hill and E Main St	Original	Secondary	138	124	42916.1
1	Washtenaw	W Michigan Ave and Platt Rd	Original	Secondary	219	213	120248.6
1	Washtenaw	State Hwy 52 and E Old US-12	Original	Secondary	183	178	142240.3
1	Ingham	N Waverly Rd and Columbia Hwy	Original	Local	65	59	1443613.0
1	Oakland	Heslip Dr and W 9 Mile Rd	Original	Local	38	34	1547895.5
1	Oakland	N Glenwood Ave and N Perry Street	Original	Local	156	144	10292666.0
1	Oakland	White Pines Dr and Beck Rd	Original	Local	32	28	1389137.0
1	Washtenaw	E Arkona Rd and Dexter St	Original	Local	114	102	1660577.6

Belt Use Stratum	County	Site Location	Site Type	Road Type	Actual Observations		Sample Weight
					Total	Belted	
2	Allegan	US Hwy 31 and M 89	Original	Primary	67	65	62514.6
2	Bay	I-75 and E Pinconning Rd	Original	Primary	87	84	62514.6
2	Bay	US Hwy 10 and W Midland Rd	Original	Primary	33	32	62514.6
2	Calhoun	I-69 and M 60 E	Original	Primary	51	49	65564.1
2	Calhoun	I-194 and E Columbia Ave	Original	Primary	169	155	102020.4
2	Eaton	I-96 and W Saginaw Hwy	Original	Primary	163	157	83778.1
2	Eaton	I-69 and E Clinton Trail	Original	Primary	107	105	64097.3
2	Jackson	I-94 and 28 Mile Rd	Original	Primary	94	91	62514.6
2	Kent	I-96 and E Beltline Ave NE	Original	Primary	238	233	164367.7
2	Kent	I-96 and 28th St SE	Original	Primary	179	170	193187.6
2	Kent	I-96 and Walker Ave NW	Original	Primary	175	171	109509.9
2	Livingston	I-96 and Fowlerville Rd	Original	Primary	133	132	101938.3
2	Monroe	Detroit-Toledo Expy and Luna Pier Rd	Original	Primary	72	66	182735.1
2	Monroe	I-75 and S Otter Creek Rd	Original	Primary	20	20	171915.2
2	Ottawa	I-196 and Adams St	Original	Primary	144	142	91142.8
2	Allegan	Viaduct Rd and Central Ave	Original	Secondary	248	232	165406.8
2	Allegan	M-89/M-40 and N. Cedar St.	Original	Secondary	272	261	131533.0
2	Allegan	US Hwy 131 and W Superior St	Original	Secondary	165	160	89113.3
2	Bay	Bay Glad Rd and W Neuman Rd	Original	Secondary	5	2	37955.7
2	Bay	State Hwy 13 and W Thomas St	Original	Secondary	309	300	271022.2
2	Bay	State Hwy 138 and S Tuscola Rd	Original	Secondary	13	11	75911.3
2	Calhoun	W Dickman Rd and Hill Brady Rd N	Original	Secondary	171	163	193934.0
2	Calhoun	M 66 and E Burr Oak Rd	Original	Secondary	136	117	111910.5
2	Eaton	N Michigan Rd and Holt Hwy	Original	Secondary	148	145	129286.5
2	Eaton	State Hwy 50 and E Lawrence Ave	Original	Secondary	175	160	129269.3
2	Eaton	W Capital Ave and S Main St	Original	Secondary	187	175	116397.4
2	Eaton	M-43 and M-66	Original	Secondary	175	171	163115.2
2	Grand Traverse	State Hwy 72 and N Division St	Original	Secondary	359	346	251080.8
2	Grand Traverse	US Hwy 31 and M 72	Original	Secondary	300	288	228231.2
2	Jackson	US Hwy 127 Bus and Washington St	Original	Secondary	127	121	202430.2
2	Jackson	State Hwy 50 and US-127	Original	Secondary	196	178	216322.5
2	Jackson	S Meridian Rd and Jefferson Rd	Original	Secondary	228	218	260513.9
2	Jackson	N Main St and Chicago St	Original	Secondary	324	300	114012.4
2	Kent	17 Mile Rd NE and Algoma Ave NE	Original	Secondary	145	143	105469.7
2	Kent	Wilson Ave SW and Burton St SW	Original	Secondary	261	259	357156.6
2	Kent	State Hwy 11 and 3 Mile Rd NW	Original	Secondary	189	185	150070.8
2	Kent	State Hwy 6 and Broadmore Ave SE	Original	Secondary	144	142	161944.2
2	Livingston	Old US Hwy 23 and White Lake Rd	Original	Secondary	173	172	101384.9
2	Livingston	E State Hwy 36 and Chilson Rd	Original	Secondary	195	193	199856.9
2	Midland	Isabella Rd and S Meridian Rd	Original	Secondary	126	112	295377.7
2	Monroe	W Monroe St and Riley St / Main St	Original	Secondary	225	213	242660.4
2	Monroe	US Hwy 23 and Tecumseh St	Original	Secondary	199	195	296054.2
2	Monroe	State Hwy 50 and Ridge Hwy	Original	Secondary	168	161	205804.0
2	Ottawa	State Hwy 45 and W Olive Rd	Original	Secondary	97	88	94889.2
2	Ottawa	Chicago Dr and Balsam Dr	Original	Secondary	229	223	208756.1
2	Calhoun	E Dr N and 9 Mile Rd	Original	Local	16	14	2441051.4
2	Jackson	Springport Rd and Parma Rd	Original	Local	11	10	5858523.4
2	Kent	Whistlevale Dr and 76th St SW	Original	Local	14	13	2441051.4
2	Kent	5 Mile Rd NE and Lincoln Lake Rd.	Original	Local	162	150	5460722.4
2	Midland	Foster Rd and E Wheeler St	Original	Local	37	36	2441051.4

Belt Use Stratum	County	Site Location	Site Type	Road Type	Actual Observations		Sample Weight
					Total	Belted	
3	Berrien	I-94 and Sawyer Rd	Original	Primary	129	118	80018.0
3	Berrien	US Hwy 31 and E Napier Ave	Original	Primary	246	237	262800.0
3	Berrien	I-196 and Hagar Shore Rd	Original	Primary	91	87	83620.3
3	Branch	I-69 and Chicago St	Original	Primary	92	88	197889.9
3	Clare	US Hwy 127 and Clare Rd	Original	Primary	40	40	77380.0
3	Clare	US Hwy 127 and E Colonville Rd	Original	Primary	288	276	103300.4
3	Genesee	I-69 and Grand River Rd	Original	Primary	41	37	77380.0
3	Genesee	I-75 and W Pierson Rd	Original	Primary	240	227	568556.9
3	Saginaw	US Hwy 23 and Dixie Hwy	Original	Primary	92	92	83332.3
3	Saginaw	US Hwy 23 and Dixie Hwy	Original	Primary	211	202	156613.4
3	Shiawassee	I-69 and State Hwy 71	Original	Primary	99	98	80245.9
3	St. Clair	I-94 and Fred W Moore Hwy	Original	Primary	115	103	83275.6
3	St. Clair	I-94 and Gratiot Rd	Original	Primary	136	127	95706.9
3	St. Clair	I-94 and Gratiot Rd	Original	Primary	146	132	107235.3
3	Van Buren	I-196 and 32nd Ave	Original	Primary	27	27	82216.3
3	Lapeer	N Branch Rd & N Van Dyke	Original	Secondary	67	60	77812.0
3	Lenawee	US Hwy 12 and M-52	Original	Secondary	195	189	189643.9
3	Lenawee	State Hwy 52 and W Monroe Rd	Original	Secondary	129	122	208477.3
3	Lenawee	State Hwy 156 and W Carleton Rd	Original	Secondary	82	73	168881.8
3	Montcalm	N Greenville Rd and W Howard City Edmore Rd	Original	Secondary	155	145	174873.0
3	Montcalm	State Hwy 46 and Holland Rd	Original	Secondary	203	201	393664.0
3	Montcalm	State Hwy 66 and W Stanton Rd	Original	Secondary	223	209	132215.5
3	Montcalm	Greenville Rd and E Vandeinse Rd	Original	Secondary	226	216	521035.8
3	Muskegon	E Apple Ave and S Maple Island Rd	Original	Secondary	203	197	359387.2
3	Newaygo	M-37 (Evergreen Dr) and Wilcox Ave.	Original	Secondary	193	178	371431.6
3	Newaygo	State Hwy 20 and N Evergreen Dr	Original	Secondary	107	103	177447.8
3	Newaygo	State Hwy 82 and Mason Dr	Original	Secondary	198	190	167102.2
3	Newaygo	Evergreen Dr and Curve St	Original	Secondary	175	169	269307.3
3	Saginaw	State Hwy 52 and E 2nd St	Original	Secondary	110	104	251587.6
3	Saginaw	Oakley Rd and W Brady Rd	Original	Secondary	180	161	420186.9
3	Saginaw	N Main St and E Holland Rd	Original	Secondary	159	146	205268.8
3	Saginaw	Vassar Rd and E Washington Rd	Original	Secondary	71	63	310464.9
3	Saginaw	M-81 and W Vassar Rd/M-15	Original	Secondary	122	114	240837.2
3	Sanilac	State Hwy 53 and W Marlette Rd	Original	Secondary	169	148	280987.7
3	Sanilac	State Hwy 46 and N Van Dyke Rd	Original	Secondary	129	118	152687.6
3	Sanilac	State Hwy 19 and Maple Valley St	Original	Secondary	272	242	325541.6
3	Sanilac	S Elk St and E Sanilac Rd	Original	Secondary	199	177	117676.5
3	Sanilac	State Hwy 46 and S Lakeshore Rd	Original	Secondary	94	87	152687.6
3	Shiawassee	S M 52 and W Lansing Rd	Original	Secondary	263	246	367335.5
3	St. Clair	State Hwy 29 and Bethuy Rd	Original	Secondary	178	155	289715.0
3	St. Clair	Gratiot Blvd and Huron Blvd	Original	Secondary	202	184	294032.8
3	St. Clair	Beard Rd and North Rd	Original	Secondary	101	94	82782.5
3	St. Joseph	US Hwy 12 and M-62	Original	Secondary	236	218	222561.6
3	St. Joseph	US Hwy 131 N and N Washington St	Original	Secondary	46	40	80470.5
3	St. Joseph	State Hwy 66 and S Centerville Rd	Original	Secondary	146	134	403095.4
3	Ionia	Button Rd and N Whites Bridge Rd	Original	Local	49	45	8872392.9
3	Lenawee	Rodesiler Hwy and Yankee Rd	Original	Local	20	19	4830971.1
3	Muskegon	Shoreline Dr and Terrace St	Original	Local	231	227	24261481.5
3	Saginaw	N Michigan Rd and Tittabawassee Rd	Original	Local	107	102	11969855.6
3	Shiawassee	Lemon Rd and E Newburg Rd	Original	Local	2	2	8644895.7

Belt Use Stratum	County	Site Location	Site Type	Road Type	Actual Observations		Sample Weight
					Total	Belted	
4	Macomb	Ford Fwy and N River Rd	Original	Primary	168	154	54712.9
4	Macomb	I-696 and Hoover Rd	Original	Primary	133	116	290198.9
4	Macomb	Walter P Reuther Fwy and Gratiot Ave	Original	Primary	122	118	149278.0
4	Macomb	Ford Fwy and Little Mack Ave	Original	Primary	129	119	68440.3
4	Wayne	Detroit Toledo Fwy and West Rd	Original	Primary	169	158	29975.5
4	Wayne	Edsel Ford Fwy and Vernier Rd / M-102	Original	Primary	150	141	179844.3
4	Wayne	Woodward Ave and 7 Mile Rd	Original	Primary	121	110	84342.1
4	Wayne	I-275 and S Huron Rd	Original	Primary	236	229	31565.1
4	Wayne	I-275 and Ford Rd	Original	Primary	171	163	177153.3
4	Wayne	I-94 and Wayne Rd	Original	Primary	131	121	49669.5
4	Wayne	Detroit Industrial Expy and Belleville Rd	Original	Primary	256	238	126121.8
4	Wayne	I-94 and Middlebelt Rd	Original	Primary	176	168	100407.2
4	Wayne	I-75 and Northline Rd	Original	Primary	166	151	43705.6
4	Wayne	I-75 and Charter St	Original	Primary	182	175	35428.3
4	Wayne	Walter P Chrysler Fwy and Mack Ave	Original	Primary	80	77	59763.3
4	Macomb	State Hwy 53 and 23 Mile Rd	Original	Secondary	139	124	74660.6
4	Macomb	State Hwy 53 Byp and Van Dyke Rd	Original	Secondary	47	43	38213.8
4	Macomb	State Hwy 53 Byp and 32 Mile Rd	Original	Secondary	130	123	195222.5
4	Macomb	State Hwy 53 and S Van Dyke Rd	Original	Secondary	181	173	284952.9
4	Macomb	State Hwy 59 and N Groesbeck Hwy / North Ave	Original	Secondary	183	173	243405.1
4	Macomb	20 Mile Rd and Romeo Plank Rd	Original	Secondary	180	165	177291.6
4	Macomb	Hall Rd and Schoenherr Rd	Original	Secondary	194	185	247686.6
4	Macomb	State Hwy 19 and 32 Mile Rd / Division Rd	Original	Secondary	226	210	138426.1
4	Macomb	Van Dyke Ave and 12 Mile Rd	Original	Secondary	124	119	224103.7
4	Macomb	Earl Memorial Hwy and E 14 Mile Rd	Original	Secondary	181	167	214661.7
4	Macomb	Van Dyke Ave and 15 Mile Rd	Original	Secondary	146	138	271736.5
4	Macomb	Metropolitan Pkwy Crossover - East Bound and Curwood	Original	Secondary	48	39	26904.5
4	Macomb	Gratiot Ave and 14 Mile Rd	Original	Secondary	214	193	349565.5
4	Macomb	S Gratiot Ave and 15 Mile Rd	Original	Secondary	38	30	1767802.4
4	Macomb	State Hwy 3 and 10 Mile Rd	Original	Secondary	180	167	321466.5
4	Wayne	US Hwy 24 and Van Horn Rd	Original	Secondary	179	160	87111.4
4	Wayne	Fort St and Van Horn Rd	Original	Secondary	133	123	169813.5
4	Wayne	State Hwy 85 and Sibley Rd	Original	Secondary	226	201	171650.5
4	Wayne	Walter P Chrysler Fwy and Caniff St	Original	Secondary	170	159	253550.7
4	Wayne	State Hwy 10 and 7 Mile Rd	Original	Secondary	259	237	69017.6
4	Wayne	Grand River Ave and Fenkell St	Original	Secondary	117	100	56546.4
4	Wayne	Grand River Ave and Beech-Daly Rd	Original	Secondary	230	205	170065.2
4	Wayne	Michigan Ave and Oakwood Blvd	Original	Secondary	118	109	113818.2
4	Wayne	US Hwy 12 and Venoy Rd	Original	Secondary	112	106	142662.6
4	Wayne	State Hwy 153 and N Wayne Rd	Original	Secondary	145	129	195053.7
4	Wayne	Telegraph Rd and Wick Rd	Original	Secondary	351	329	254357.5
4	Wayne	S Telegraph Rd and Van Born Rd	Original	Secondary	328	305	284639.4
4	Wayne	Michigan Ave and Evergreen Rd	Original	Secondary	134	118	203613.0
4	Wayne	State Hwy 39 and Oakwood Blvd	Original	Secondary	100	99	120200.9
4	Wayne	State Hwy 3 and Grand Blvd W	Original	Secondary	57	45	136549.5
4	Macomb	Hiawatha Dr and Jewell Rd	Original	Local	63	51	1291087.8
4	Macomb	Beacon Square Dr and 21 Mile Rd	Original	Local	93	86	1289875.5
4	Macomb	Pinehurst and Martin Rd	Original	Local	24	20	1325516.8
4	Wayne	Pinewood Ave and Hoover St	Original	Local	25	20	1205015.3
4	Wayne	Prevost St and Grand River Ave	Original	Local	7	7	2410030.6

APPENDIX IV

List of 83-County Statewide Observation Survey Locations by County, Including Belt Use Observation Data

		Drivers		Passengers		Total	
County	Site Location	Observations	% Belted	Observations	% Belted	Observations	% Belted
Alcona	M-72 & M-65	36	94.4%	15	100.0%	51	96.1%
Alger	M-94 & M-28	43	86.0%	14	92.9%	57	87.7%
Allegan	M-89/M-40 & N Cedar St.	217	96.8%	55	92.7%	272	96.0%
Allegan	US-131 & W Superior St	138	96.4%	27	100.0%	165	97.0%
Allegan	US-31 & Central Ave	186	95.7%	62	87.1%	248	93.6%
Alpena	M-65 & M-32	125	92.8%	38	97.4%	163	93.9%
Antrim	US-131 & M-88	193	94.8%	73	93.1%	266	94.4%
Arenac	US-23 & M-61	239	87.4%	85	90.6%	324	88.3%
Baraga	M-38 & US-41	143	75.5%	58	69.0%	201	73.6%
Barry	M-43 & M-37	195	93.8%	48	91.7%	243	93.4%
Bay	M-13 & W Thomas St	242	97.1%	67	97.0%	309	97.1%
Bay	M-138 & S Tuscola Rd	10	80.0%	3	100.0%	13	84.6%
Benzie	US-31 & M-115	256	93.7%	88	96.6%	344	94.5%
Berrien	US-12 (W. Ash St) & S. Elm St	195	87.7%	113	94.7%	308	90.3%
Branch	US-12 & N. Fiske Rd	268	94.8%	67	91.0%	335	94.0%
Calhoun	W Dickman Rd & Hill Brady Rd N	137	95.6%	34	94.1%	171	95.3%
Cass	M-60 & M-40	156	90.4%	45	88.9%	201	90.1%
Charlevoix	US-31 & M-66	251	92.8%	106	97.2%	357	94.1%
Cheboygan	M-68 & M-68	114	94.7%	35	88.6%	149	93.3%
Cheboygan	US-23 & US-23	39	89.7%	16	100.0%	55	92.7%
Chippewa	M-28 & M-123	114	93.9%	75	94.7%	189	94.2%
Clare	E 5th St & Bus 127	135	93.3%	40	95.0%	175	93.7%
Clinton	M-21 & Bus-127	172	95.3%	36	97.2%	208	95.6%
Crawford	M-72 & I-75 Business loop	180	92.2%	64	90.6%	244	91.8%
Delta	US-41 & M-35	91	93.4%	26	100.0%	117	94.9%
Dickinson	US-2 & B St	221	90.5%	59	88.1%	280	90.0%
Eaton	M-50 & E Lawrence Ave	138	91.3%	37	91.9%	175	91.4%
Eaton	M-78 (W Capital Ave) & S Main St	150	93.3%	37	94.6%	187	93.6%
Eaton	M-99 (Michigan Rd) & Holt Hwy	128	98.4%	20	95.0%	148	97.9%
Emmet	M-68 & US-31	225	96.5%	96	95.9%	321	96.3%
Genesee	M-57 & M-15	157	89.8%	23	91.3%	180	90.0%
Gladwin	M-61 & M-18	206	88.3%	69	92.8%	275	89.4%
Gogebic	US-2 & US-45	103	94.2%	44	93.2%	147	93.9%
Grand Traverse	M-72 & N Division St	278	96.4%	81	96.3%	359	96.4%
Grand Traverse	US-31 & M-72	229	96.1%	71	95.8%	300	96.0%
Gratiot	M-46 & Bus-127	149	94.0%	44	95.5%	193	94.3%
Hillsdale	M-99 & US-12	168	94.6%	48	85.4%	216	92.6%
Houghton	M-26 & Green Acres Rd	196	93.9%	55	89.1%	251	92.8%
Huron	M-142 & M-25	151	77.5%	29	86.2%	180	78.9%
Huron	M-142 & M-53	152	89.5%	31	80.6%	183	88.0%
Ingham	M-43 (E Saginaw St) & N Larch St	189	94.2%	26	100.0%	215	94.9%
Ingham	M-43 (Gr& River Ave) & Marsh Rd	164	98.2%	7	100.0%	171	98.3%
Ingham	M-52 & N Clinton St	144	99.3%	35	100.0%	179	99.4%
Ingham	M-99 (Eaton Rapids Rd) & Bishop Rd	165	100.0%	26	100.0%	191	100.0%

		Drivers		Passengers		Total	
County	Site Location	Observations	% Belted	Observations	% Belted	Observations	% Belted
Ingham	M-99 (Martin Luther King Jr Blvd) & W Jolly Rd	166	98.2%	30	100.0%	196	98.5%
Ingham	M-99 & W Holmes Rd	170	94.7%	24	91.7%	194	94.3%
Ionia	M-66 & E. Main St	146	89.7%	41	90.2%	187	89.8%
Iosco	M-65 & Main St	121	87.6%	39	79.5%	160	85.6%
Iron	M-189 & US-2	167	92.2%	38	92.1%	205	92.2%
Isabella	Bus 127 & Mission Rd	113	92.9%	37	91.9%	150	92.7%
Jackson	M-50 & US-127	151	92.7%	45	84.4%	196	90.8%
Jackson	N Main St & Chicago St	260	93.8%	64	87.5%	324	92.6%
Jackson	US-127 Bus (Cooper St) & Washington St	102	96.1%	25	92.0%	127	95.3%
Kalamazoo	M-89 (C Ave) & 32nd St N	32	96.9%	11	90.9%	43	95.4%
Kalamazoo	M-96 (E Michigan Ave) & 35th St N	223	89.2%	60	93.3%	283	90.1%
Kalkaska	US-131 & M-72	202	96.0%	74	97.3%	276	96.4%
Kent	17 Mile Rd NE & Algoma Ave NE	113	98.2%	32	100.0%	145	98.6%
Keweenaw	US-41 & Bumbletown Rd	130	88.5%	43	90.7%	173	89.0%
Lake	US-10 & Michigan Ave	68	94.1%	22	100.0%	90	95.5%
Lapeer	M-90 (N Branch Rd) & N Van Dyke	52	90.4%	15	86.7%	67	89.6%
Leelanau	M-22 & M-72	134	96.2%	67	95.5%	201	96.0%
Lenawee	M-156 & W Carleton Rd	65	90.8%	17	82.4%	82	89.1%
Lenawee	M-52 & W Monroe Rd	103	96.1%	26	88.5%	129	94.6%
Lenawee	US-12 & M-52	157	98.1%	38	92.1%	195	96.9%
Livingston	M-36 & Chilson Rd	177	98.9%	18	100.0%	195	99.0%
Luce	M-123 & M-28	173	95.4%	77	98.7%	250	96.4%
Mackinac	M-117 & US-2	77	98.7%	28	96.4%	105	98.1%
Macomb	M-3 (Gratiot Ave) & 10 Mile Rd	150	92.7%	30	93.3%	180	92.8%
Macomb	M-3 (Gratiot Ave) & 14 Mile Rd	177	91.0%	37	86.5%	214	90.2%
Macomb	M-3 (Gratiot Ave) & 15 Mile Rd	30	80.0%	8	75.0%	38	78.9%
Macomb	M-53 (Van Dyke) & 15 Mile Rd	125	96.0%	21	85.7%	146	94.5%
Macomb	M-53 (Van Dyke) & E 14 Mile Rd	150	94.0%	31	83.9%	181	92.3%
Macomb	M-53 (Van Dyke) at 12 Mile Rd	111	96.4%	13	92.3%	124	96.0%
Macomb	M-53 & 23 Mile Rd	126	88.9%	13	92.3%	139	89.2%
Macomb	M-53 & 32 Mile Rd	111	94.6%	19	94.7%	130	94.6%
Macomb	M-53 & Van Dyke Rd	186	95.2%	42	92.9%	228	94.8%
Manistee	US-31 & Lynn ST	196	92.9%	73	97.3%	269	94.1%
Marquette	US-41 & M-28	214	94.9%	69	95.7%	283	95.1%
Mason	US-10 & S Jackson Rd	156	94.9%	42	95.2%	198	95.0%
Mecosta	M-20 & 157th Avenue	130	93.8%	34	100.0%	164	95.1%
Menominee	US-2 & US-41	161	94.4%	57	93.0%	218	94.0%
Midland	M-20 (Isabella Rd) & S Meridian Rd	98	88.8%	28	89.3%	126	88.9%
Missaukee	M-55 & M-66	83	98.8%	27	100.0%	110	99.1%
Monroe	M-50 (Tecumseh) at Riley St/Main St	177	94.4%	48	95.8%	225	94.7%
Monroe	M-50 & Ridge Hwy	135	96.3%	33	93.9%	168	95.8%
Monroe	US-23 at Tecumseh St	160	97.5%	39	100.0%	199	98.0%
Montcalm	Greenville Rd & E Vandeinse Rd	177	94.4%	49	100.0%	226	95.6%
Montcalm	M-46 & M-66	147	99.3%	56	98.2%	203	99.0%
Montcalm	M-66 & W Stanton Rd	179	94.4%	44	90.9%	223	93.7%
Montcalm	M-91 & W Howard City Edmore Rd	116	91.4%	39	100.0%	155	93.6%

		Drivers		Passengers		Total	
County	Site Location	Observations	% Belted	Observations	% Belted	Observations	% Belted
Montmorency	M-32 (State St) & M-33 (Main St)	124	95.2%	63	95.2%	187	95.2%
Muskegon	M-46 (E Apple) & S Maple Island Rd	147	97.3%	56	96.4%	203	97.1%
Newaygo	M-20 & N Evergreen Dr	73	97.3%	34	94.1%	107	96.3%
Newaygo	M-37 (Evergreen Dr) & Curve St	127	96.9%	48	95.8%	175	96.6%
Newaygo	M-37 (Evergreen Dr) & Wilcox Ave	141	90.8%	52	96.2%	193	92.3%
Newaygo	M-82 & Mason Dr	143	94.4%	55	100.0%	198	96.0%
Oakland	M-1 (Woodward) & W Big Beaver Rd	150	95.3%	32	93.8%	182	95.0%
Oakland	M-10 (Northwestern) & Orchard Lake	134	87.3%	19	89.5%	153	87.6%
Oakland	M-10 (Northwestern) & W 13 Mile Rd	168	97.0%	17	94.1%	185	96.7%
Oakland	M-15 & E Seymour Lake Rd	147	88.4%	17	88.2%	164	88.4%
Oakland	M-150 & E Avon Road	138	97.1%	10	90.0%	148	96.6%
Oakland	M-24 (Lapeer Rd) & Dutton Rd	113	96.5%	21	90.5%	134	95.6%
Oakland	M-5 (Grand River) & W 8 Mile Road	110	95.5%	13	100.0%	123	96.0%
Oakland	S Main St & E University Dr	129	93.0%	17	94.1%	146	93.1%
Oakland	US-24 (Dixie Hwy) & Williams Lake	119	91.6%	12	75.0%	131	90.1%
Oakland	US-24 (Telegraph Road) & W Maple	151	96.7%	14	85.7%	165	95.8%
Oceana	M-20 & 1st St	143	98.6%	59	96.6%	202	98.0%
Ogemaw	M-55 & M-33	165	93.9%	67	94.0%	232	93.9%
Ontonagon	US-45 & M-28	129	92.2%	47	95.7%	176	93.2%
Osceola	M-66 & US-10	188	94.7%	59	94.9%	247	94.7%
Oscoda	M-33 & M-72	160	96.9%	63	87.3%	223	94.2%
Otsego	M-32 (W Main St) & I-75	170	91.2%	51	92.2%	221	91.4%
Ottawa	M-45 (Lake Michigan Dr.) & US-31	76	89.5%	21	95.2%	97	90.7%
Presque Isle	M-33 & M-68	88	87.5%	29	89.7%	117	88.0%
Roscommon	M-55 & S Harrison Rd	169	92.9%	54	90.7%	223	92.4%
Saginaw	M-15 (Vassar Rd) & E Washington Rd	59	89.8%	12	83.3%	71	88.7%
Saginaw	M-52 (Oakley Rd) & W Brady Rd	129	90.7%	51	86.3%	180	89.5%
Saginaw	M-52 & E 2nd St	88	94.3%	22	95.5%	110	94.5%
Saginaw	M-81 & W Vassar Rd/M-15	97	94.8%	25	88.0%	122	93.4%
Saginaw	M-83 (Gera Rd) & E Holland Rd	151	91.4%	8	100.0%	159	91.8%
Sanilac	M-19 (S Elk St) & E Sanilac Rd	157	87.9%	42	92.9%	199	89.0%
Sanilac	M-19 & Maple Valley St.	212	89.2%	60	88.3%	272	89.0%
Sanilac	M-46 & N Van Dyke Rd	97	93.8%	32	84.4%	129	91.5%
Sanilac	M-46 & S Lakeshore Rd	65	90.8%	29	96.6%	94	92.6%
Sanilac	M-53 & W Marlette Rd	143	86.0%	26	96.2%	169	87.6%
Schoolcraft	M-77 & M-28	81	97.6%	37	100.0%	118	98.3%
Shiawassee	M 52 & W Lansing Rd	207	95.2%	56	87.5%	263	93.6%
St Clair	I-94 Bus (Gratiot Blvd) & Huron Blvd	174	90.2%	28	96.4%	202	91.1%
St Clair	M-136 (Beard Rd) & North Rd	83	91.6%	18	100.0%	101	93.1%
St Clair	M-29 & Bethuy Rd	154	87.0%	24	87.5%	178	87.1%
St Joseph	M-60 & US-131 (Broadway Rd)	203	96.6%	60	95.0%	263	96.2%
Tuscola	M-24 & M-25	176	88.6%	39	97.4%	215	90.2%
Tuscola	M-24 & M-46	114	88.6%	33	84.8%	147	87.7%
Van Buren	M-43 & M-40	129	95.3%	13	92.3%	142	95.0%
Washtenaw	M-52 (Ann Arbor St) E Main St	120	90.8%	18	83.3%	138	89.8%
Washtenaw	M-52 & E Old US-12	159	96.9%	24	100.0%	183	97.3%

		Drivers		Passengers		Total	
County	Site Location	Observations	% Belted	Observations	% Belted	Observations	% Belted
Washtenaw	US Hwy 23 & Washtenaw Ave	106	96.2%	15	100.0%	121	96.7%
Washtenaw	US-12 (W Michigan Ave) & N Ann Arbor St	87	94.3%	18	88.9%	105	93.4%
Washtenaw	US-12 (W Michigan Ave) & Platt Rd	202	97.0%	17	100.0%	219	97.2%
Wayne	M-1 (Woodward Ave) & 7 Mile Rd	138	95.7%	32	84.4%	170	93.6%
Wayne	M-85 (Fort St) & Sibley Rd	192	88.5%	34	91.2%	226	88.9%
Wayne	M-85 (Fort St) & Van Horn Rd	114	94.7%	19	78.9%	133	92.4%
Wayne	US-24 (Telegraph Rd) & Van Horn Rd	157	90.4%	22	81.8%	179	89.3%
Wexford	M-115 & M-55	149	94.6%	53	100.0%	202	96.0%

APPENDIX V

2015 Vehicle Miles Traveled in Michigan, by County

County	2015 VMT in THOUSANDS (from MDOT Highway Performance Monitoring System)	% of Statewide VMT
Alcona	112,531	0.12%
Alger	155,915	0.16%
Allegan	1,381,184	1.41%
Alpena	290,918	0.30%
Antrim	268,972	0.27%
Arenac	298,186	0.30%
Baraga	116,122	0.12%
Barry	426,968	0.44%
Bay	1,204,059	1.23%
Benzie	209,867	0.21%
Berrien	1,957,181	2.00%
Branch	467,141	0.48%
Calhoun	1,673,446	1.71%
Cass	462,504	0.47%
Charlevoix	254,232	0.26%
Cheboygan	321,233	0.33%
Chippewa	376,634	0.38%
Clare	358,923	0.37%
Clinton	1,104,463	1.13%
Crawford	288,453	0.29%
Delta	390,567	0.40%
Dickinson	241,191	0.25%
Eaton	1,189,578	1.22%
Emmet	360,185	0.37%
Genesee	4,095,921	4.19%
Gladwin	231,635	0.24%
Gogebic	146,527	0.15%
Grand Traverse	883,850	0.90%
Gratiot	543,258	0.56%
Hillsdale	397,280	0.41%
Houghton	251,236	0.26%
Huron	321,242	0.33%
Ingham	2,342,026	2.39%
Ionia	781,391	0.80%
Iosco	278,289	0.28%
Iron	130,503	0.13%
Isabella	648,567	0.66%
Jackson	1,669,808	1.71%
Kalamazoo	2,436,668	2.49%
Kalkaska	227,490	0.23%
Kent	6,184,417	6.32%
Keweenaw	37,469	0.04%
Lake	108,051	0.11%
Lapeer	899,852	0.92%
Leelanau	238,942	0.24%

County	2015 VMT in THOUSANDS (from MDOT Highway Performance Monitoring System)	% of Statewide VMT
Lenawee	891,550	0.91%
Livingston	2,326,306	2.38%
Luce	78,972	0.08%
Mackinac	261,615	0.27%
Macomb	6,346,390	6.49%
Manistee	261,773	0.27%
Marquette	572,330	0.58%
Mason	298,747	0.31%
Mecosta	433,938	0.44%
Menominee	335,367	0.34%
Midland	866,564	0.89%
Missaukee	158,834	0.16%
Monroe	2,094,117	2.14%
Montcalm	601,031	0.61%
Montmorency	108,158	0.11%
Muskegon	1,499,628	1.53%
Newaygo	421,596	0.43%
Oakland	12,727,490	13.01%
Oceana	259,962	0.27%
Ogemaw	270,668	0.28%
Ontonagon	110,562	0.11%
Osceola	363,219	0.37%
Oscoda	89,716	0.09%
Otsego	355,024	0.36%
Ottawa	2,023,275	2.07%
Presque Isle	142,434	0.15%
Roscommon	385,092	0.39%
Saginaw	2,109,367	2.16%
Sanilac	392,162	0.40%
Schoolcraft	175,722	0.18%
Shiawassee	742,670	0.76%
St Clair	1,571,132	1.61%
St Joseph	542,095	0.55%
Tuscola	523,507	0.54%
Van Buren	1,011,800	1.03%
Washtenaw	3,927,760	4.01%
Wayne	15,394,692	15.73%
Wexford	400,671	0.41%
STATEWIDE	**97,843,201**	**100.00%**